

**P E N N S Y L V A N I A**

# **Occupational Outlook Handbook**

**2006  
Edition**

**Construction**

**Transportation and Distribution**

**Volume 2 of 6**

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# How to Use the Pennsylvania Occupational Outlook Handbook

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The *Pennsylvania Occupational Outlook Handbook* is best used as a reference; it is not meant to be read in its entirety. Instead, look in the Table of Contents for specific occupations that interest you. For any occupation that sounds interesting, use the *Handbook* to learn about the type of work, education and training requirements, advancement possibilities, earnings, job outlook, and related occupations. Each occupational description follows a standard format, making it easy for you to compare occupations.

This document provides an overview of how the occupational articles are organized in the *Handbook*. It highlights information presented in each section and offers tips on how to interpret the information.

Unless otherwise noted, the source of employment and earnings data presented in the *Handbook* is the Pennsylvania Department of Labor & Industry, Center for Workforce Information & Analysis. Nearly all *Handbook* articles cite employment and earnings data from the Occupational Employment Statistics (OES) survey. Some articles include data from outside sources. OES data may be used to compare earnings among occupations; however, outside data may not be used in this manner because characteristics of these data vary widely.

The following are descriptions of the subheadings that appear under each of the occupations included in this handbook:

## Significant Points

This section highlights key occupational characteristics.

## Nature of the Work

This section describes what types of activities are involved in a particular occupation. Individual job duties may vary by industry or employer. For instance, workers in larger firms tend to be more specialized, whereas those in smaller firms often have a wider variety of duties. Most occupations have several levels of skills and responsibilities through which workers may progress. Beginners may start as trainees performing routine tasks under close supervision. Experienced workers usually undertake more difficult tasks and are expected to perform with less supervision.

## Working Conditions

It is important to research the working conditions of an occupation. This section identifies the typical hours worked, the workplace environment, physical activities and susceptibility to injury, special equipment, and the extent of travel required. In many occupations, people work regular business hours - 40 hours a week, Monday through Friday - but in many others, they do not. For example, waiters and waitresses often work evenings and weekends.

## Employment

This section reports the number of jobs the occupation provided in 2004 (nationwide and Pennsylvania) and the key industries where these jobs are found. When significant, the geographic distribution of jobs and the proportion of part-time (less than 35 hours a week) and self-employed workers in the occupation are mentioned.

## Job Outlook

The long-term job outlook is a factor to consider when deciding on an occupation. This section shows anticipated growth or decline for an occupation in Pennsylvania by comparing actual 2004 employment figures with projected employment for 2014. In addition, this section describes the factors that will result in growth or decline in the number of jobs. In some cases, the *Handbook* mentions that an occupation is likely to provide numerous job openings or relatively few openings. Occupations that are large and have high turnover, such as cashiers and retail sales positions, generally provide the most job openings. Susceptibility to layoffs due to imports, slowdowns

in economic activity, technological advancements, or budget cuts are also addressed in this section. For example, employment of construction craft workers is sensitive to slowdowns in construction activity, while employment of government workers is sensitive to budget cuts.

## Earnings

This section discusses typical earnings and how workers are compensated—annual salaries, hourly wages, commissions, piece rates, tips, or bonuses. Within every occupation, earnings vary by experience, responsibility, performance, tenure, and geographic area. Earnings data are from the Occupational Employment Statistics annual survey of Pennsylvania employers. Average hourly earnings for entry-level and experienced-level workers are now available as well.

Benefits account for a significant portion of total compensation costs to employers. Benefits such as paid vacation, health insurance, and sick leave may not be mentioned because they are so widespread. Though not as common as traditional benefits, employers may offer flexible hours and profit sharing plans to attract and retain highly qualified workers. Less common benefits also include childcare, tuition for dependents, housing assistance, summers off, and free or discounted merchandise or services.

## Training, Other Qualifications and Advancement

Knowing what kinds of training or education are required for a job is an important part of career planning. This section describes the most significant sources of training, including the training preferred by employers, the typical length of training, and advancement possibilities. Job skills are sometimes acquired through high school, informal on-the-job training, formal training (including apprenticeships), the Armed Forces, home study, hobbies, or previous work experience. For example, sales experience is particularly important for many sales jobs, which may not require any education beyond high school. Many professional and technical jobs, on the other hand, require formal post-secondary education—vocational or technical training, or college, postgraduate, or professional education.

Also discussed here are the qualifications usually expected of job applicants, as well as opportunities for advancement or promotion. Some occupations require certification or licensing to enter the field, to advance, or to practice independently. Certification or licensing generally involves completing courses and passing examinations. Increasingly, many occupations have continuing education or skill improvement requirements to keep up with the changing economy or to improve advancement opportunities.

## Related Occupations

Occupations involving similar duties, skills, interests, education, and training are listed.

## Sources of Additional Information

No single publication can completely describe all aspects of an occupation. Thus, the *Handbook* lists mailing addresses for associations, government agencies, unions, and other organizations that can provide occupational information. In some cases, toll free phone numbers and Internet addresses also are listed. Links to non-BLS Internet sites are provided for your convenience and do not constitute an endorsement.

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(717) 787-6466 or toll-free at 1-877-493-3282.

# Construction

## Construction Introduction

The construction industry is divided into three major segments: general building contractors, heavy construction contractors, and special trade contractors. General building contractors build residential, industrial, commercial, and other buildings. Heavy construction contractors build sewers, roads, highways, bridges, tunnels, and other projects. Special trade contractors engage in specialized tasks such as carpentry, painting, plumbing and electrical work.

Construction projects are usually coordinated by general contractors. General contractors take full responsibility for the complete job, but often subcontract most of the work to heavy construction or special trade contractors. Special trade contractors usually do the work of only one trade or of two closely related trades, such as plumbing and heating.

Over a quarter million Pennsylvanians are employed in construction trades, with the concentration of employment being in highly industrialized and populated areas, or in growing areas. The majority of these workers are employed in special trades. Those trades with the highest employment are carpenters, electricians, plumbers, and painters. Most of these workers are employed with contractors that employ fewer than 10 people.

Work in construction offers a variety of career opportunities for people with different skill levels and educational backgrounds. Many start out as helpers or laborers and advance to construction craft occupations once they acquire the needed skills through apprenticeships or on-the-job training.

Construction earnings are higher than the average for all industries. Earnings in construction vary by education and experience, type of work, size and nature of the construction project, geographic location, and economic conditions. Special trades workers generally earn more than those workers employed by building or heavy construction contractors.

The overall rate of growth in the construction industry is currently expected to be lower than the average for all industries; however, there should be ample opportunities for someone looking to enter this field, due to the large number of openings that arise each year from experienced workers who leave jobs.

Included in this publication is an in-depth look at 26 occupations in construction. Each occupation is examined in terms of working conditions, employment outlook, wages, training and many other aspects that are designed to assist in making informed career decisions.

## Construction Occupations

The occupations in green are either new to this edition or have had a name change since the last.

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Blue-Collar Worker Supervisors

Boilermakers

**Brickmasons, Blockmasons & Stonemasons**

Carpenters

Carpet, Floor & Tile Installers & Finishers

**Cement Masons, Concrete Finishers, Segmental Pavers & Terrazzo Workers**

Construction & Building Inspectors

Elevator Installers & Repairs

Glaziers

Handlers, Equipment Cleaners, Helpers & Laborers

Hazardous Materials Removal Workers

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## Blue-Collar Worker Supervisors

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SOC CODES: 47-1011, 49-1011, 51-1011, 53-1011, 53-1021 and 53-1031

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### Significant Points

- Employers prefer to promote applicants with postsecondary technical degrees.
- Organizational restructuring and technological developments will moderate employment growth.
- Over one-third worked for manufacturing companies.

### Nature of the Work

- *Blue-collar worker supervisors* oversee the work of construction, maintenance, production, and transportation workers. Although duties are varied, a supervisor's primary task is to ensure that workers, materials, and equipment are used properly to maximize productivity.
- Computers are used to schedule procedures, monitor worker output, track materials, update inventory, and perform other supervisory tasks.
- Supervisors inform workers about company policies, provide employee reviews and recommend disciplinary action. They also meet regularly with management to report any problems and discuss possible solutions.

### Working Conditions

- Blue-collar worker supervisors usually start the day early and stay late. They may work any shift, as well as weekends and holidays.
- Work environments vary with industry. Many work on a shop floor, where they spend most of the day on their feet. Others work outdoors even in severe weather conditions.
- Organizational restructuring and downsizing have increased supervisor responsibilities. Therefore, on-the-job stress has also increased.

### Employment

- Blue-collar worker supervisors held about 2.4 million jobs in 2004 in the United States and approximately 86,060 jobs in Pennsylvania.
- Although found in almost all industries, the majority of blue-collar worker supervisors were found in manufacturing establishments. Others were employed in construction and transportation.
- The following table includes the industry groups that employed the most blue-collar worker supervisors in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Manufacturing	29,140	33.9%
Construction	13,810	16.1%
Wholesale & Retail Trade	10,420	12.1%
Transportation	6,750	7.8%
Government	5,520	6.4%
Self-Employed	4,730	5.5%

### Job Outlook

- Employment of blue-collar worker supervisors in Pennsylvania is expected to decrease from approximately 86,060 in 2004 to approximately 89,050 in 2014. Blue-collar worker supervisors can expect about 335 openings due to growth and about 1,829 replacement openings for approximately 2,164 total annual openings.
- Projected job growth varies by industry. For the most part, as the number of blue-collar workers increases, so will the need for supervisors. However, organizational restructuring and technological developments will help moderate employment growth.
- Because of their skill and seniority, blue-collar worker supervisors are usually protected from layoffs during periods of economic decline.

### Earnings

- In Pennsylvania, blue-collar worker supervisors averaged \$34,900 to \$57,400 annually in 2005. Entry-level wages were between \$21,900 and \$36,200, while experienced blue-collar worker supervisors earned anywhere from \$41,400 to \$68,000.
- The following table includes the average annual, entry level, and experienced level wages in 2005 for different blue-collar worker supervisors in Pennsylvania.

Occupational Title	Average Annual Wage	Entry Level Wage	Experienced Level Wage
Supervisors - Construction Trades & Extraction Workers	\$57,370	\$36,120	\$68,000
Supervisors - Mechanics, Installers & Repairers	\$54,890	\$35,730	\$64,460
Supervisors - Production & Operating Workers	\$51,020	\$33,370	\$59,840
Aircraft Cargo Handling Supervisors	\$34,970	\$21,980	\$41,460
Supervisors - Helpers, Laborers & Material Movers, Hand	\$45,040	\$28,620	\$53,260
Supervisors - Trans. & Material-Moving Machine/Vehicle Oprs	\$51,540	\$32,420	\$61,110

### Training, Other Qualifications and Advancement

When choosing a supervisor, employers look for well-rounded workers who are knowledgeable and organized. Those who are able to motivate employees, maintain morale and command respect have the best advancement opportunities. Strong communication and interpersonal skills are extremely important attributes.

Although the minimum educational requirement is a high school diploma, many organizations prefer to promote applicants with post-secondary technical degrees. In fact, supervisors in highly technological industries may need a bachelor's degree. Regardless of their previous education, workers receive additional training in human resources, computer software, and management before advancing into a supervisory position.

Training requirements for advanced opportunities beyond a supervisory level differ by industry. Supervisors in manufacturing companies usually need a business or engineering degree and in-house training to advance to department head or production manager. In the construction industry, a degree in construction management or engineering is often needed to become a project manager, operations manager, or general superintendent. Some blue-collar worker supervisors eventually open their own businesses.

### Related Occupations

Workers in other occupations with responsibilities and duties related to those of blue-collar supervisors include those who supervise professional, technical, sales, clerical, and service workers.

### Sources of Additional Information

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- American Management Association, 1601 Broadway, New York, NY 10019. Internet: <http://www.amanet.org>
- National Management Association, 2210 Arbor Blvd., Dayton, OH 45439. Internet: <http://www.nma1.org>
- American Institute of Constructors, 466 94th Ave. N., St. Petersburg, FL 33702. Internet: <http://www.aicnet.org>

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## Boilermakers

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SOC CODE: 47-2011

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### Significant Points

- A formal apprenticeship is recommended for learning this trade.
- Prospective boilermakers face strong competition for limited job prospects.
- Most were employed with manufacturing and construction companies.

### Nature of the Work

- **Boilermakers** make, install, and repair boilers, vats, and other large vessels that hold liquids and gases.
- High-pressure vessels are usually made in sections, which are then lifted, aligned, and welded together using complex machinery and tools. Once the vessel is assembled, boilermakers attach parts and test for leaks or other defects.
- Although boilers and other vessels last a long time, boilermakers must regularly maintain them and update components to increase efficiency

### Working Conditions

- Boilermakers usually work a 40-hour week. Overtime work may be necessary when equipment has been shut down for maintenance or in order to meet deadlines.
- Work is often done inside boilers, vats, or tanks that are often cramped, damp, and poorly ventilated.
- To reduce the risk of injuries, boilermakers may wear hardhats, harnesses, protective clothing, safety glasses, safety shoes, and respirators.

### Employment

- Boilermakers held about 18,800 jobs in 2004 in the United States and approximately 620 jobs in Pennsylvania.
- Over 32 percent worked for manufacturers of boilers, tanks and shipping containers. More than 22 percent were employed in utility system construction.

### Job Outlook

- Employment of boilermakers in Pennsylvania is expected to decrease from approximately 620 in 2004 to approximately 580 in 2014. About 23 annual openings will result from replacement needs. Although no net employment growth is expected statewide, growth openings may occur in some areas.
- Potential boilermakers face limited jobs prospects and strong competition, due to a limited number of apprenticeships and relatively good wages for experienced boilermakers.
- Growth will be limited by a trend toward repairing existing boilers, the use of smaller boilers, and the automation of production technologies.
- Industries that purchase boilers are sensitive to economic conditions. However, maintenance and repair work must continue. Therefore, boilermakers generally have stable employment.

### Earnings

Average hourly earnings of boilermakers in Pennsylvania were \$23.30 in 2005. The entry-level rate for boilermakers in 2005 was \$16.06 while an experienced boilermaker made \$26.92.

### Training, Other Qualifications and Advancement

Most training authorities recommend a formal apprenticeship to learn this trade. Apprenticeship programs usually consist of two years of on-the-job training, supplemented by classroom instruction. Classroom subjects include set-up and assembly rigging, welding, blueprint reading, and layout. Experienced boilermakers often attend apprenticeship classes to keep their knowledge current.

When an apprenticeship becomes available, the local union publicizes the opportunity by notifying local vocational schools and high school vocational programs. Qualified applicants take an aptitude test specifically designed for boilermaking. The apprenticeship is awarded to the person scoring highest on this test.

Some boilermakers learn their skills by working as helpers. When hiring helpers, employers prefer high school or vocational school graduates. Courses in shop, mathematics, welding, blueprint reading, and machine metalworking provide a strong knowledge base. Mechanical aptitude and manual dexterity are also necessary in order to handle tools properly.

Boilermakers may advance to supervisory positions. Because of their broader training and wider range of skill, apprentices usually have the advantage when up for a promotion.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of boilermakers include assemblers and fabricators; machinists; industrial machinery installation, repair, and maintenance workers; pipelayers, plumbers, pipefitters, and steamfitters; sheet-metal workers; tool and die makers; and welding, soldering, and brazing workers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- American Boiler Manufacturing Association, 4001 N. 9<sup>th</sup> St., Suite 226, Arlington, VA 22203-1900.  
Internet: <http://www.abma.com>
- The Boilermakers Union - International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers, and Helpers, 753 State Ave., Suite 570, Kansas City, KS 66101.  
Internet: <http://www.boilermakers.org>

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## Brickmasons, Blockmasons & Stonemasons

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SOC CODES: 47-2021 and 47-2022

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### Significant Points

- Opportunities for employment should be very good.
- A formal apprenticeship is recommended for learning this trade.
- Almost one in four were self-employed.

### Nature of the Work

- Brick, block and stonemasons create attractive yet durable surfaces and structures. They also repair imperfections and replace broken or missing masonry units in walls and floors.  
*Brickmasons and blockmasons*, also known as bricklayers, build walls, floors, fireplaces, and chimneys with brick, pre-cast masonry panels, concrete block, and other masonry materials. They spread a bed of mortar, place the bricks on the mortar bed, and tap them into place.  
*Stonemasons* build walls and set stone exteriors and floors on nonresidential structures. They use a special hammer and chisel to cut stone along the grain.  
*Refractory masons* are bricklayers who specialize in installing firebrick and refractory tile in high-temperature boilers, furnaces, cupolas, ladles, and soaking pits.
- Large contractors usually employ bricklayers working in nonresidential construction while small contractors employ those working in residential construction.

### Working Conditions

- Brick, block and stonemasons spend most of their time working outdoors.
- They often stand, kneel, and bend for long periods and may lift heavy materials.
- Proper safety procedures must be followed to help avoid common hazards including injuries and falls.

### Employment

- Brick, block and stonemasons held about 176,900 jobs in 2004 in the United States and approximately 7,240 jobs in Pennsylvania.
- Two-thirds worked for masonry and building foundation contractors. Another 21 percent were self-employed.

### Job Outlook

- Employment of brick, block and stonemasons in Pennsylvania is expected to grow from approximately 7,240 in 2004 to approximately 7,920 in 2014. Brick, block and stonemasons can expect about 68 openings due to growth and about 107 replacement openings for approximately 175 total annual openings.
- Job opportunities for skilled workers are expected to be excellent, as the growth in opportunities outpaces the supply of workers trained in this craft. However, employment of bricklayers who specialize in refractory repair will decline.
- Employment of brick, block and stonemasons is sensitive to changes in the economy. When the level of construction activity falls, workers can experience periods of unemployment.

### Earnings

- Average hourly earnings of brickmasons and blockmasons (bricklayers) in Pennsylvania were \$19.51 in 2005. The entry-level rate for bricklayers in 2005 was \$12.38 while experienced bricklayers made \$23.08.
- Average hourly earnings of stonemasons in Pennsylvania were \$19.19 in 2005. The entry-level rate for a stonemason in 2005 was \$12.94 while an experienced stonemason made \$22.31.

### Training, Other Qualifications and Advancement

Many brick, block and stonemasons pick up their skills by observing experienced workers. Others receive training in vocational education schools. However, the best way to learn is through an apprenticeship program.

Individuals who learn the trade on the job usually start as helpers, laborers, or mason tenders. They carry materials, move scaffolds, and mix mortar. Experienced workers teach them how to spread mortar, lay brick, and set stone. As hands-on experience is gained, helpers make the transition to bricklayer or stonemason. On-the-job learning normally lasts longer than an apprenticeship program.

Apprenticeship programs, sponsored by local contractors or union-management committees, usually last three years and combine on-the-job training with classroom instruction. Applicants must be at least 17 years old and in good physical condition. A high school education is preferred. Previous course work in shop, mathematics, and mechanical drawing provides a strong background for aspiring bricklayers and stonemasons.

Experienced brick, block and stonemasons can advance to supervisory positions or become contract estimators. Some open their own business and work as independent contractors.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of brick, block and stonemasons include carpet, floor, and tile installers and finishers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; and plasterers and stucco masons.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Associated General Contractors of America, 333 John Carlyle St., Suite 200, Alexandria, VA 22314.  
Internet: <http://www.agc.org>
- The Brick Industry Association, 11490 Commerce Park Dr., Reston, VA 20191-1525.  
Internet: <http://www.brickinfo.org>
- National Concrete Masonry Association, 13750 Sunrise Valley Dr., Herndon, VA 20171.  
Internet: <http://www.ncma.org>

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## Carpenters

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SOC CODES: 47-2031

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### Significant Points

- Those with all-around skills will have the best job prospects.
- A formal apprenticeship is recommended for learning this trade.
- Nearly one-quarter of all carpenters were self-employed.

### Nature of the Work

- **Carpenters** cut, fit, and assemble wood and other materials in the construction of buildings, highways, bridges, docks, and industrial plants. They must be familiar with the local building codes.
- Each task is somewhat different but the basic steps are the same. Blueprints and other instructions are used to measure, mark, and arrange materials. Carpenters then use hand and power tools to cut and shape materials. When finished, carpenters check the accuracy of their final product and make any necessary adjustments.
- Individuals with basic overall training are at a distinct advantage because they can switch from residential building to commercial construction to remodeling work, depending on which offers the best opportunities.
- Those employed outside of the construction industry perform a variety of installation and maintenance work. In manufacturing firms, they may also assist in moving machinery.

### Working Conditions

- Carpenters spend most of their time working outdoors. Prolonged periods of standing, climbing, bending, and kneeling are common.
- Proper safety procedures must be followed to help avoid common hazards including injuries, slips, and falls.
- Some carpenters change employers each time they finish a construction job. Others alternate between working for a contractor and working as contractors themselves on small jobs.

### Employment

- Carpenters held about 1.3 million jobs in 2004 in the United States and approximately 46,860 jobs in Pennsylvania.
- Most carpenters worked for contractors who build, remodel, or repair buildings and other structures. Another 24 percent were self-employed.
- The following table includes the industries that employed the most carpenters in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
Residential Building Construction	11,770	25.1%
Self-Employed	11,010	23.5%
Nonresidential Building Construction	7,330	15.7%
Building Finishing Contractors	4,400	9.4%

### Job Outlook

- Employment of carpenters in Pennsylvania is expected to grow from approximately 46,860 in 2004 to approximately 50,790 in 2014. Carpenters can expect about 393 openings due to growth and about 763 replacement openings for approximately 1,156 total annual openings.
- Increased demand for carpenters will create additional job openings. Opportunities for frame carpenters should be particularly good. However, this demand will be offset by the increasing use of prefabricated components.
- Improved equipment, techniques, and materials have vastly increased worker versatility. Therefore, carpenters with all-around skills will have better opportunities than those who can only perform a few routine tasks.
- Employment of carpenters is sensitive to changes in the economy. When the level of construction activity falls, carpenters can experience periods of unemployment.

## **Earnings**

Average hourly earnings of carpenters in Pennsylvania were \$17.48 in 2005. The entry-level rate for a carpenter in 2005 was \$10.92 while an experienced carpenter made \$20.75.

## **Training, Other Qualifications and Advancement**

Many carpenters acquire skills through vocational education programs. Others participate in employer training programs or apprenticeships. Informal on-the-job training is normally less thorough than an apprenticeship.

Most employers recommend an apprenticeship program as the best way to learn carpentry. Apprenticeship programs, sponsored by local contractors or local union-management committees, usually last three to four years and combine on-the-job training with classroom instruction. Applicants must be at least 17 years old and meet local requirements. A high school education is preferred. In fact those with previous course work in carpentry, shop, mechanical drawing, and general mathematics may have an advantage. Employers and apprenticeship committees also view training and work experience obtained in the Armed Services or Job Corps favorably.

Carpenters may advance to carpentry supervisor or general construction supervisor positions. Some open their own business or work as independent contractors.

## **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of carpenters include brickmasons, blockmasons, and stonemasons; assemblers and fabricators; machinists; industrial machinery installation, repair, and maintenance workers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; electricians; pipelayers, plumbers, pipefitters, and steamfitters; and plasterers and stucco masons.

## **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Associated Builders and Contractors, 4250 N. Fairfax Dr., 9th Fl., Arlington, VA 22203. Internet: <http://www.abc.org>
- Associated General Contractors of America, 333 John Carlyle St., Suite 200, Alexandria, VA 22314. Internet: <http://www.agc.org>
- Home Builders Institute, 1201 15<sup>th</sup> St., 6<sup>th</sup> Fl., Washington, DC 20005. Internet: <http://www.hbi.org>
- United Brotherhood of Carpenters and Joiners of America, 101 Constitution Ave., NW, Washington, D.C. 20001. Internet: <http://www.carpenters.org>



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## Carpet, Floor & Tile Installers & Finishers

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SOC CODES: 47-2041, 47-2042, 47-2043 and 47-2044

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### Significant Points

- Job opportunities for carpet installers are expected to be good as growth outpaces supply of trained workers.
- Most learn their trade informally as helpers to experienced workers.
- One out of every three were self-employed.

### Nature of the Work

- Carpet, floor, and tile installers lay floor coverings in homes, offices, hospitals, stores, and restaurants.
- **Carpet installers** inspect the surface to be covered and correct any imperfections. They measure the area to be carpeted and plan the carpet layout. Finally, they roll out, measure, mark, cut, and install the carpet.
- **Tile installers and marble setters** apply tile and marble to floors, walls, and ceilings. Tile installers use cement or “mastic,” a very sticky paste, to set tiles. Sometimes, they pre-arrange tiles on a dry floor to examine the pattern and make changes. **Tile finishers** often help out tile installers by supplying and mixing construction materials, applying grout, and cleaning the installed tile.
- **Floor installers**, or *floor layers*, apply blocks, strips, or sheets of shock-absorbing, sound-deadening, or decorative coverings to floors and cabinets. First, they inspect the surface to be covered and correct any imperfections. Then they measure, cut, and install floor-covering materials according to designated blueprints.

### Working Conditions

- Carpet, floor and tile workers generally work indoors, during regular business hours. They may work evenings and weekends when re-carpeting stores or offices to avoid disturbing customers or employees.
- Workers spend much of their time bending, kneeling, and reaching. Carpet installers frequently lift heavy rolls of carpet and may move heavy furniture. Safety regulations may require they wear kneepads or safety goggles when using certain tools.
- Although subject to minor cuts, falls, and strained muscles, this occupation is not as hazardous as other construction occupations.

### Employment

- Carpet, floor and tile workers held about 184,000 jobs in 2004 in the United States and approximately 6,730 jobs in Pennsylvania.
- More than half worked for flooring contractors or floor covering retailers. About one-third were self-employed.
- The following table includes the industries that employed the most carpet, floor and tile workers in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
Building Finishing Contractors	2,370	35.2%
Self-Employed	2,200	32.6%
Home Furnishings Stores	1,460	21.6%

### Job Outlook

- Employment of carpet, floor and tile workers in Pennsylvania is expected to grow from approximately 6,730 in 2004 to approximately 7,280 in 2014. These workers can expect about 55 openings due to growth and about 105 replacement openings for approximately 160 total annual openings.
- Job opportunities for carpet installers are expected to be good as the growth in demand outpaces the supply of trained workers. This occupation is less sensitive to changes in economic conditions because much of the work involves replacing carpet in existing buildings.
- Demand for tile setters will stem from population and business growth as tile is expected to increase in popularity as a building material. However, job opportunities for tile setters will not be as plentiful because the occupation is small and turnover relatively low.

### Earnings

- Carpet, floor and tile workers had very different wages in Pennsylvania in 2005. Tile and marble setters had the highest hourly wage at all levels of experience. Floor sanders and finishers had the lowest wages at all levels of experience.
- Rather than an hourly rate, some carpet installers are paid based on the number of yards of carpet they installed.
- The following chart includes the average annual, entry level and experienced level wages for carpet, floor and tile workers in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Carpet Installers	\$14.72	\$9.73	\$17.21
Floor Layers	\$18.27	\$10.01	\$22.40
Floor Sanders and Finishers	\$12.85	\$9.00	\$14.78
Tile and Marble Setters	\$19.85	\$13.81	\$22.87

### Training, Other Qualifications and Advancement

Most carpet, floor and tile workers learn their trade informally as helpers to experienced workers. Others learn through formal apprenticeship programs, which include on-the-job training and related classroom instruction.

Informal training for carpet installers is often sponsored by individual contractors and generally lasts one-and-a-half to two years. Apprenticeship programs are usually sponsored by local contractors or by local union-management committees. These programs combine on-the-job training with related classroom instruction and usually last about three to four years.

Potential carpet installers should be at least 18 years old and have good manual dexterity. A high school education is preferred. Previous courses in general mathematics and shop may provide an advantage. Some employers may also require a driver's license and criminal background check. Because they frequently deal directly with customers, carpet installers should be courteous and tactful.

When hiring apprentices or helpers for floor layer and tile setter jobs, employers prefer high school graduates. Those who have had courses in general mathematics, mechanical drawing, and shop may have an advantage. Good physical condition, manual dexterity, and a good sense of color harmony are also important traits.

Carpet, floor and tile workers may advance to supervisor or managerial positions. Some go into sales while others become contract estimators. Many also go into business for themselves.

### Related Occupations

Workers in other occupations with responsibilities and duties related to those of carpet, floor and tile workers include brickmasons, blockmasons, and stonemasons; carpenters; cement masons, concrete finishers, segmental pavers, and terrazzo workers; drywall installers, ceiling tile installers, and tapers; painters, and paperhangers; roofers; and sheet-metal workers.

### Sources of Additional Information

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- International Union of Bricklayers and Allied Craftsmen, 1776 Eye Street, NW, Washington, DC 20006. Internet: <http://www.bacweb.org>
- Floor Covering Installation Contractors Association, 7439 Millwood Dr., West Bloomfield, MI 48322. Internet: <http://www.fcica.com>
- International Union of Painters and Allied Trades, 1750 New York Ave., NW, Washington, D.C. 20006. Internet: <http://www.iupat.org>
- National Association of Home Builders, 1201 15<sup>th</sup> St., NW, Washington, D.C. 20005. Internet: <http://www.nahb.com>
- United Brotherhood of Carpenters and Joiners of America, 101 Constitution Ave., NW, Washington, D.C. 20001. Internet: <http://www.carpenters.org>

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## Cement Masons, Concrete Finishers, Segmental Pavers & Terrazzo Workers

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SOC CODE: 47-2051, 47-2053 and 47-4091

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### Significant Points

- Job opportunities are expected to be good as growth outpaces the supply of trained workers.
- Most learn their trade through on-the-job training or formal apprenticeship programs.
- Concrete or terrazzo work is fast-paced, strenuous, and requires continuous physical effort.

### Nature of the Work

- Cement masons, concrete finishers, segmental pavers and terrazzo workers all work with concrete, which becomes the foundation for everything from decorative patios and floors to huge dams or miles of roadways.
- **Cement masons** set the forms, direct the pouring, and level freshly placed concrete. They may also color concrete surfaces, expose aggregate in walls and sidewalks, or fabricate concrete beams, columns, and panels.
- **Concrete finishers** use an edger to slightly round the edges of the leveled concrete. This helps prevent chipping and cracking.
- **Segmental pavers** lay out, cut, and install pavers, which are made out of compacted brick or concrete, to cover paths, patios, playgrounds, driveways, and steps.
- **Terrazzo workers** create attractive walkways, floors, patios, and panels by exposing marble chips and other fine aggregates on the surface of finished concrete.

### Working Conditions

- Concrete or terrazzo work is fast-paced, strenuous, and requires continuous physical effort. Cement masons, concrete finishers, segmental pavers, and terrazzo workers must bend and kneel a lot.
- Many jobs are outdoors and work is generally halted during inclement weather. The work may be in areas that are muddy, dusty, and dirty.
- To avoid chemical burns and sore knees, many wear kneepads. Workers also wear water-repellent boots while working in wet concrete.

### Employment

- Cement masons, concrete finishers, segmental pavers and terrazzo workers held about 209,200 jobs in 2004 in the United States and approximately 4,890 jobs in Pennsylvania.
- Most worked for concrete contractors or for general contractors who work on non-residential projects.
- The following table includes the industries that employed the most cement masons, concrete finishers, segmental pavers and terrazzo workers in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
Building Foundation/Exterior Contractors	1,420	29.1%
Other Specialty Trade Contractors	1,080	22.0%
Highway, Street & Bridge Construction	480	9.8%
Cement & Concrete Product Manufacturing	360	7.3%

### Job Outlook

- Employment of cement masons, concrete finishers, segmental pavers and terrazzo workers in Pennsylvania is expected to grow from approximately 4,890 in 2004 to approximately 5,280 in 2014. These workers can expect about 43 openings due to growth and about 97 replacement openings for approximately 140 total annual openings. The demand for cement masons, concrete finishers, segmental pavers and terrazzo workers will rise as the population, economy, and use of concrete grows.
- Opportunities are expected to be good as the growth in demand outpaces the supply of trained workers. However, employment is sensitive to the fluctuations of the economy and workers may experience periods of unemployment when the level of nonresidential construction falls. On the other hand, worker shortages may occur in some areas during peak periods of building activity.

### Earnings

- In Pennsylvania, cement masons, concrete finishers, segmental pavers and terrazzo workers averaged \$15.40 to \$18.80 per hour in 2005. Entry-level wages were between \$10.30 and \$12.30, while experienced workers earned anywhere from \$17.80 to \$22.20.
- The following table includes the average hourly, entry level, and experienced level wages in 2005 for different cement masons, concrete finishers, segmental pavers and terrazzo workers in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Cement Masons & Concrete Finishers	\$18.78	\$12.26	\$22.04
Terrazzo Workers & Finishers	\$18.23	\$10.35	\$22.17
Segmental Pavers	\$15.41	\$10.61	\$17.81

### Training, Other Qualifications and Advancement

Cement masons, concrete finishers, segmental pavers and terrazzo workers learn their trades through on-the-job training, vocational-technical schools, or apprenticeship programs. Many gain practical experience as construction laborers.

On-the-job training programs consist of informal instruction from experienced workers. Helpers learn to use the tools, equipment, and materials of the trade. As they progress, assignments become more complex. Trainees usually do finishing work within a short time.

Apprenticeship programs, sponsored by local contractors or local union-management committees, usually last three years and combine on-the-job training with related classroom instruction. Apprentices generally receive special instruction in layout work and cost estimating. A written test and a physical exam may be required.

When hiring helpers and apprentices, employers prefer high school graduates who are at least 18 years old and in good physical condition. Those with a driver's license and previous course work in general science, shop, mathematics, blueprint reading, or mechanical drawing may have an advantage. Cement masons, concrete finishers, segmental pavers and terrazzo workers should enjoy demanding work, have pride in their craftsmanship, and be able to work without close supervision.

Experienced cement masons, concrete finishers, segmental pavers and terrazzo workers may become supervisors or contract estimators. Some open their own concrete businesses.

### Related Occupations

Workers in other occupations with responsibilities and duties related to those of cement masons, concrete finishers, segmental pavers and terrazzo workers include brickmasons, blockmasons and stonemasons; carpet, floor and tile installers and finishers; drywall installers, ceiling tile installers and tapers; and plasterers and stucco masons.

### Sources of Additional Information

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Associated General Contractors of America, 333 John Carlyle St., Suite 200, Alexandria, VA 22314. Internet: <http://www.agc.org>
- International Union of Bricklayers and Allied Craftsmen, 1776 Eye St., NW, Washington, DC 20006. Internet: <http://www.bacweb.org>
- Operative Plasterers' and Cement Masons' International Association, 14405 Laurel Pl., Suite 300, Laurel, MD 20707. Internet: <http://www.opcmia.org>
- National Terrazzo and Mosaic Association, 110 E. Market St., Suite 200 A, Leesburg, VA 20176. Internet: <http://www.ntma.com>
- Portland Cement Association, 5420 Old Orchard Rd., Skokie, IL 60077. Internet: <http://www.portcement.org>
- United Brotherhood of Carpenters and Joiners of America, 101 Constitution Ave., NW, Washington, D.C. 20001. Internet: <http://www.carpenters.org>

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## Construction & Building Inspectors

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SOC CODE: 47-4011

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### Significant Points

- Inspectors tend to be older, more experienced workers.
- Most construction and building inspectors work alone.
- Federal, State and local government agencies employed many inspectors.

### Nature of the Work

- Construction and building inspectors examine the construction, alteration or repair of buildings, highways, streets, sewer systems, water systems, dams, bridges, and other structures to ensure compliance with building codes and ordinances, zoning regulations, and contract specifications. Some investigate construction that is being done without proper permits.

*Building inspectors* inspect the structural quality and general safety of buildings.

*Plan examiners* determine whether the plans for a building or structure comply with building code regulations and if they are suited to the engineering and environmental demands of the site.

*Electrical inspectors* examine the installation of electrical systems and equipment to ensure they function properly and comply with electrical codes and standards.

*Elevator inspectors* examine lifting and conveying devices such as elevators, escalators, moving sidewalks, inclined railways, ski lifts, and amusement rides.

*Mechanical inspectors* inspect the installation of the mechanical components of commercial equipment.

*Plumbing inspectors* examine plumbing systems.

*Public works inspectors* ensure that Federal, State, and local government construction of water and sewer systems, highways, streets, bridges, and dams conform to detailed contract specifications.

*Home inspectors* conduct inspections of newly built or previously owned homes.

*Specification inspectors* represent the owners' and ensure that work is done to design specifications.

- Although inspections are primarily visual, inspectors also use tape measures, survey instruments, and metering devices. They keep a log of their work, take photographs, file reports, and may act on their findings.
- Many inspectors use computers to monitor construction activities and keep track of issued permits.

### Working Conditions

- Construction and building inspectors normally work a standard 40-hour week. However, overtime may be required during periods of heavy construction activity. If an accident occurs at a construction site, inspectors must respond immediately and may work additional hours to complete their report.
- Inspectors spend their time in field offices and at work sites, which are often dirty and cluttered with tools, materials, or debris. They may have to climb ladders or stairs and crawl around in tight spaces.
- Although their work is not generally considered hazardous, inspectors wear hard hats and adhere to other safety requirements while at a construction site.
- Most construction and building inspectors work alone. However, several may be assigned to complex projects.

### Employment

- Construction and building inspectors held about 94,100 jobs in 2004 in the United States and approximately 4,090 jobs in Pennsylvania.
- Almost 50 percent were employed with government agencies. Another 37 percent worked for engineering, architectural and surveying firms.

### Job Outlook

- Employment of construction and building inspectors in Pennsylvania is expected to grow from approximately 4,090 in 2004 to approximately 4,400 in 2014. Construction and building inspectors can expect about 30 openings due to growth and about 92 replacement openings for approximately 122 total annual openings.
- Growing concern for public safety and improvements in the quality of construction should continue to stimulate demand for construction and building inspectors.
- Construction and building inspectors tend to be older, more experienced workers who have spent years in other occupations. Opportunities should be best for highly experienced supervisors and craft workers who have some college education, engineering or architectural training, or inspector certification.

## **Earnings**

Average annual earnings of construction and building inspectors in Pennsylvania were \$42,100 in 2005. The entry-level wage for a construction inspector in 2005 was \$28,180 while an experienced construction inspector made \$49,060.

## **Training, Other Qualifications and Advancement**

Construction and building inspectors learn their skills through on-the-job training. Trainees learn about codes, ordinances, regulations, inspection techniques, contract specifications, and record keeping from experienced inspectors.

Individuals who want to become construction and building inspectors should have several years of experience as a manager, supervisor, or craft worker. A high school diploma or equivalent is required but most employers prefer applicants with a degree from a community or junior college. In fact, many community colleges offer certificate or associate degree programs in building inspection technology. Courses in blueprint reading, algebra, geometry, and English are useful.

Certification is required by most employers and can enhance an inspector's opportunity for employment and advancement. To become certified, inspectors with substantial experience and education must pass stringent examinations on code requirements, construction techniques, and materials.

Aspiring construction and building inspectors must be in good physical condition in order to walk and climb about construction sites. In addition, they should have a valid driver's license. Government agencies may require that inspectors pass a civil service exam.

Continuing education is imperative in this field. Because they advise builders and the general public on building codes and construction practices, construction and building inspectors must keep abreast of changes in these areas. An engineering or architectural degree is often required for advancement to supervisory positions.

## **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of construction and building inspectors include architects, construction managers, civil engineers, cost estimators, drafters, engineering technicians, surveyors, cartographers, photogrammetrists, and surveying technicians.

## **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- International Code Council, 5203 Leesburg Pike, Suite 600, Falls Church, VA 22041.  
Internet: <http://www.iccsafe.org>
- American Society of Home Inspectors, Inc., 932 Lee St., Suite 101, Des Plaines, IL 60016.  
Internet: <http://www.ashi.com>
- Association of Construction Inspectors, 1224 N. Nokomis NE, Alexandria, MN 56308.  
Internet: <http://www.iami.org/ACI/home.cfm>
- International Association of Electrical Engineers, 901 Waterfall Way, Suite 602, Richardson, TX 75080.  
Internet: <http://www.iaei.org>

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## Construction Equipment Operators

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SOC CODES: 47-2071, 47-2072 and 47-2073

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### Significant Points

- Demand should keep pace with the growth of the construction industry.
- Most learn their skills on-the-job but some complete formal apprenticeship programs.

### Nature of the Work

- Construction equipment operators use machinery to move construction materials, earth, and other heavy materials. They apply asphalt and concrete to roads and other substructures. Some set up and inspect equipment, make adjustments, and perform minor repairs.
- Different equipment operators perform different functions.

**Grader, bulldozer, and scraper operators** gouge out, distribute, level, and grade earth using vehicles equipped with a concave blade on the front. They may also uproot trees and move large rocks.

**Operating engineers** operate several different types of power construction equipment including cranes, derricks, excavation machines, loading machines, and industrial tractors. They also operate and maintain air compressors and pumps at construction work sites.

**Paving and surfacing equipment operators** control machines that spread and level asphalt or concrete for roadways and other substructures.

**Asphalt paving machine operators** regulate the temperature and flow of asphalt onto the roadbed. Paving material must be distributed evenly and without voids.

**Concrete paving machine operators** use equipment with a special attachment to spread, vibrate, and level wet concrete within forms.

**Tamping equipment operators** control machines that compact earth and other fill materials for roadbeds. They may also cut or break up old pavement and drive guardrail posts into earth.

### Working Conditions

- Construction equipment operators work outdoors, in all weather conditions.
- Some construction equipment operators work in remote locations on large construction projects. Others work in factory or mining operations.
- Machines, such as bulldozers, scrapers, and tampers, are very noisy and often shake or jolt the operator.

### Employment

- Construction equipment operators held about 448,900 jobs in 2004 in the United States and approximately 20,370 jobs in Pennsylvania.
- Over 38 percent were employed with government agencies. Many others worked in the construction industry.
- The following table includes the industries that employed the most construction equipment operators in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
State Government	5,320	26.1%
Other Specialty Trade Contractors	3,850	18.9%
Local Government	2,540	12.5%
Highway, Street & Bridge Construction	2,200	10.8%

### Job Outlook

- Employment of construction equipment operators in Pennsylvania is expected to grow from approximately 20,370 in 2004 to approximately 21,400 in 2014. Construction equipment operators can expect about 104 openings due to growth and about 497 replacement openings for approximately 601 total annual openings.
- Demand for most construction equipment operators should keep pace with the growth of the construction industry. Increased spending on highways, bridges, and dams should result in slightly stronger demand for paving, surfacing, and tamping equipment operators.

- Technological advances have led to better equipment that will increase productivity. In turn, this will slow the employment growth of operating engineers as well as grader, bulldozer, and scraper operators.
- Employment of construction equipment operators is sensitive to fluctuations in the economy. Workers may experience periods of unemployment when the level of construction activity falls.

### **Earnings**

- In Pennsylvania, construction equipment operators earned average hourly wages of \$15.70 to \$30.10 in 2005. Entry-level wages were between \$10.90 and \$29.20, while experienced construction equipment operators earned anywhere from \$18.20 to \$30.50.
- The following table includes the average hourly, entry level, and experienced level wages in 2005 for different construction equipment operators in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Paving, Surfacing & Tamping Equipment Operators	\$15.77	\$10.91	\$18.21
Pile-Driver Operators	\$30.01	\$29.16	\$30.43
Operating Engineer	\$18.46	\$12.97	\$21.21

### **Training, Other Qualifications and Advancement**

Construction equipment operators usually learn their skills through on-the-job training. Employers look for high school graduates with a good sense of balance, the ability to judge distance, and good eye-hand-foot coordination. Those with mechanical aptitude and previous experience operating mobile equipment may have an advantage.

Trainees usually handle light equipment under the guidance of an experienced operator. With experience, trainees learn to operate heavier equipment, such as bulldozers and cranes. Operators of construction equipment with computerized controls may need more training and some understanding of electronics.

Some construction equipment operators take part in formal apprenticeship programs administered by union-management committees. Apprenticeship programs consist of at least three years of on-the-job training and related classroom instruction. Because apprentices learn to operate a wider variety of machines, they usually have better job opportunities.

Some private vocational schools offer instruction in the operation of certain construction equipment. Completion of such a program may help a person get a job as a trainee or apprentice. However, those considering these training programs should first check the reputation of the school among employers in the area.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of construction equipment operators include truck drivers and driver/sales workers; farmers, ranchers, and agricultural managers; agricultural workers; and forest, conservation, and logging workers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- National Center for Construction Education and Research, PO Box 141104, Gainesville, FL 32614-1104. Internet: <http://www.nccer.org>
- Associated General Contractors of America, 333 John Carlyle St., Suite 200, Alexandria, VA 22314. Internet: <http://www.agc.org>
- International Union of Operating Engineers, 1125 17th St. NW, Washington, DC 20036. Internet: <http://www.iuoe.org>



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## Construction Managers

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SOC CODE: 11-9021

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### Significant Points

- The increasing level and complexity of construction activity will spur demand.
- Individuals with work experience and a bachelor's degree will have the best opportunities
- Construction managers are on-call and must be available 24 hours a day.

### Nature of the Work

- **Construction managers** oversee the organization, scheduling, and implementation of various construction projects. They may have job titles, such as *constructor*, *construction superintendent*, *general superintendent*, *project engineer*, *project manager*, *general construction manager*, or *executive construction manager*.
- Managers evaluate various construction methods and determine the most cost-effective plan. They coordinate all construction activities and schedule the time required to meet established deadlines. They also oversee the laborers and are responsible for ensuring the safety of employees and the general public.
- Meetings are held regularly with owners, trade contractors, architects, and other design professionals to monitor and coordinate all phases of the construction project.

### Working Conditions

- Construction managers often work more than 40 hours per week. They must be on-call 24 hours a day, to deal with delays, bad weather, or emergencies at the site.
- Many construction managers work in the main office where a construction project is monitored. Others work in a field office located at the construction site.
- Travel to a project site is often necessary. Construction managers may even have to set-up temporary residence in another state or country during certain projects.
- Although their work is not inherently dangerous, construction managers must be careful while touring construction sites.

### Employment

- Construction managers held about 430,600 jobs in 2004 in the United States and approximately 12,120 jobs in Pennsylvania.
- About 44 percent were self-employed. Another 40 percent worked in the construction industry.
- The following table includes the industries that employed the most construction managers in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
Self-Employed	5,350	44.1%
Nonresidential Building Construction	1,670	13.7%
Residential Building Construction	950	7.8%
Building Equipment Contractors	790	6.5%

### Job Outlook

- Employment of construction managers in Pennsylvania is expected to grow from approximately 12,120 in 2004 to approximately 12,830 in 2014. Construction managers can expect about 70 openings due to growth and about 220 replacement openings for approximately 290 total annual openings.
- Prospects should be best for those with a bachelor's degree in building science, construction management, or construction engineering as well as practical work experience.
- The increasing complexity of construction projects should increase demand for management level personnel within the construction industry.
- Employment of construction managers can be sensitive to the short-term nature of many construction projects and cyclical fluctuations in construction activity.

## **Earnings**

- Average annual earnings of construction managers in Pennsylvania were \$74,020 in 2005. The entry-level wage for a construction manager in 2005 was \$46,360 while an experienced manager made \$87,860.
- Earnings vary depending upon the size and nature of the construction project, its geographic location, and economic conditions.

## **Training, Other Qualifications and Advancement**

Employers like to hire individuals who combine industry work experience with a bachelor's degree in building science or construction management. Advanced degree programs are available for individuals who wish to become top-level construction managers, college professors, or conduct research.

An increasing number of graduates from related fields enter construction management after gaining substantial hands-on experience or completing graduate level programs. Individuals may attend training and educational programs sponsored by industry associations. A number of two-year colleges throughout the country offer construction management or construction technology programs.

The American Institute of Constructors (AIC) and the Construction Management Association of America (CMAA) offer voluntary certification programs for construction professionals. The AIC awards the designations Associate Constructor (AC) and Certified Professional Constructor (CPC) to candidates who meet the experience requirements and pass the construction examination. Likewise, the CMAA awards the designation Certified Construction Manager (CCM) to those who meet the experience requirements in a construction management firm, complete a professional construction management course, and pass a technical examination. Although certification is not required, it does provide evidence of competence and experience.

Aspiring construction managers need a solid background in building science and knowledge of construction methods, materials, and regulations. They need to understand contracts, plans, and specifications. Familiarity with computers and software programs for job costing, scheduling, and estimating is increasingly important. Construction managers should be flexible and work effectively in a fast-paced environment. They should be decisive, have strong leadership skills, and have the ability to coordinate several major activities at once. Good oral and written communication skills are also important. Construction managers must be able to establish a good working relationship with many different people.

Advancement opportunities vary with an individual's performance and the company for which they work. Within large firms, managers may eventually become top-level managers or executives. Some become independent consultants while others serve as expert witnesses in court or as arbitrators in disputes.

## **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of construction managers include architects, civil engineers, cost estimators, landscape architects, and engineering managers.

## **Sources of Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Associated Builders and Contractors, 4250 N. Fairfax Dr., 9<sup>th</sup> Fl, Arlington, VA 22203.  
Internet: <http://www.abc.org>
- Associated General Contractors of America, 333 John Carlyle St., Suite 200, Alexandria, VA 22314.  
Internet: <http://www.agc.org>
- American Institute of Constructors, 466 94th Ave. North, St. Petersburg, FL 33702.  
Internet: <http://www.aicnet.org>
- Construction Management Association of America, 7918 Jones Branch Dr., Suite 540, McLean, VA 22102.  
Internet: <http://www.cmaanet.org>
- American Council for Construction Education, 1300 Hudson Lane, Suite 3, Monroe, LA 71201.  
Internet: <http://www.acce-hq.org>

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## **Cost Estimators**

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SOC CODE: 13-1051

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### **Significant Points**

- Employers prefer applicants who have practical experience in addition to a college degree.
- Growth will be strong in the construction industry and relatively stable in manufacturing firms.
- Over 50 percent were employed in the construction industry.

### **Nature of the Work**

- Cost estimators compile and analyze data on all the factors that can influence project costs. Job duties vary widely depending on the type and size of the project.
- Within the construction industry, the cost estimation process begins with the decision to submit a bid. After reviewing drawings and specifications, a visit is made to the proposed site. With the information gathered “on-site”, the cost estimator determines equipment needs, sequence of operations, and crew size. All of these findings are included in the cost summary.
- In manufacturing firms, cost estimators determine the costs associated with making a product. A job usually begins with a request from management. Information is then gathered and analyzed by the cost estimator. The cost of purchasing parts is compared with the cost of manufacturing them to determine which is cheaper.
- Although computers cannot be used for the entire estimating process, they can be used for complex mathematical calculations.

### **Working Conditions**

- Cost estimators normally work a 40-hour week. Overtime work is common when facing deadlines.
- Most cost estimators spend their time in an office. Those employed in the construction industry often visit the dusty, dirty, and occasionally hazardous project site. Likewise, those in manufacturing firms must spend time on the factory floor where it can be noisy and dirty.
- Frequent travel between a firm’s headquarters and its subsidiaries or subcontractors may be required.
- Cost estimators often work under pressure and stress. Inaccurate estimating can cause a firm to lose a bid or lose money on a job that was not accurately estimated.

### **Employment**

- Cost estimators held about 197,900 jobs in 2004 in the United States and approximately 7,510 jobs in Pennsylvania.
- Over 50 percent worked in construction. Another 20 percent were employed in the manufacturing industry.

### **Job Outlook**

- Employment of cost estimators in Pennsylvania is expected to grow from approximately 7,510 in 2004 to approximately 8,330 in 2014. Cost estimators can expect about 81 openings due to growth and about 168 replacement openings for approximately 249 total annual openings.
- Growth of the construction industry will be the driving force behind the demand for cost estimators. Opportunities will be best for those with a college degree and practical experience in construction.
- Employment of cost estimators in manufacturing should remain relatively stable as firms continue to identify and control their operating costs. Experienced cost estimators with college degrees and computer expertise should have the best job prospects in manufacturing firms.

### **Earnings**

Average annual earnings of cost estimators in Pennsylvania were \$52,150 in 2005. The entry-level wage for a cost estimator in 2005 was \$33,190 while an experienced cost estimator made \$61,640.

### **Training, Other Qualifications and Advancement**

Entry requirements for cost estimators vary by industry. In the construction industry, employers prefer individuals with a degree in building construction, construction management, engineering, or architecture as well as considerable hands-on construction experience. In manufacturing firms, employers look for individuals with a degree in engineering, physical science, operations research, mathematics, or statistics. Regardless of their background, cost estimators receive additional training on the job.

Colleges and universities often include cost estimating as part of their civil engineering, industrial engineering, construction management, or construction engineering technology curriculums. Specialized courses and programs in cost estimating are also offered at many technical schools and community colleges. Organizations representing cost estimators also sponsor educational and professional development programs for students, estimators-in-training, and experienced cost estimators.

Voluntary certification can provide professional recognition of a cost estimator's competence and experience. In some instances, individual employers may even require professional certification for employment. To become certified, cost estimators usually have between three and seven years of estimating experience and must pass both a written and an oral examination. In addition, certification requirements may include publication of at least one article or paper in the field.

Aspiring cost estimators should have an aptitude for mathematics and the ability to quickly analyze, compare, and interpret information. Assertiveness and self-confidence are important in presenting and supporting their conclusions. Strong communication and interpersonal skills are essential because estimators usually work as part of a project team alongside managers, owners, engineers, and design professionals. Knowledge of computers, including word-processing, spreadsheet, and special estimation software, is also helpful.

For most cost estimators, advancement takes the form of higher pay and prestige. Some move into management positions, such as project manager or industrial engineering manager. Others may become consultants and go into business for themselves.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of cost estimators include accountants and auditors; budget analysts; claims adjusters, appraisers, examiners, and investigators; economists and market and survey researchers; financial analysts and personal financial advisors; insurance underwriters; loan counselors and officers; and operations research analysts.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- AACE International, 209 Prairie Ave., Suite 100, Morgantown, WV 26501. Internet: <http://www.aacei.org>
- American Society of Professional Estimators, 2525 Perimeter Drive Place, Nashville, TN, 37214. Internet: <http://www.aspenational.com>
- Society of Cost Estimating and Analysis, 101 S. Whiting St., Suite 201, Alexandria, VA 22304. Internet: <http://www.sceaonline.net>

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## Drafters

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SOC CODES: 17-3011, 17-3012 and 17-3013

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### Significant Points

- Opportunities should be best for those with formal training and experience using CAD systems.
- Employers are most interested in applicants who have completed postsecondary school training.
- Voluntary certification is available.

### Nature of the Work

- Drafters prepare technical drawings that are used by production and construction workers to build everything from manufactured products to structures. Their drawings specify dimensions, materials to be used, and which procedures to follow.
- Most drafters now use computer-aided drafting (CAD) systems to prepare drawings. This tool allows drawings to be stored electronically so that revisions or duplications can be made easily. However, manual drafting may still be used for certain applications.
- As CAD technology advances and the cost continues to fall, it is likely that almost all drafters will use CAD systems on a regular basis in the future.
- Drafting work has many specializations and titles may denote a particular discipline.

*Architectural drafters* draw structural features of buildings and other structures. They may specialize by the type of structure or material used.

*Aeronautical drafters* prepare engineering drawings used in the manufacture of aircraft, missiles, and parts.

*Electrical drafters* prepare wiring and layout diagrams used by workers who erect, install, and repair electrical equipment and wiring.

*Electronic drafters* draw wiring diagrams, circuit board assembly diagrams, schematics, and layout drawings used in the manufacture, installation, and repair of electronic devices and components.

*Civil drafters* prepare drawings and maps used in major construction or civil engineering projects.

*Mechanical drafters* prepare detail and assembly drawings of machinery and mechanical devices.

*Process piping or pipeline drafters* prepare drawings used for layout, construction, and operation of oil and gas fields, refineries, chemical plants, and process piping systems.

### Working Conditions

- Drafters usually work in comfortable offices furnished to accommodate their tasks. They may sit at adjustable drawing boards or drafting tables when doing manual drawings.
- Because they spend most of their time working on computers, drafters are susceptible to eyestrain, back discomfort, and hand and wrist problems.

### Employment

- Drafters held about 230,000 jobs in 2004 in the United States and approximately 11,160 jobs in Pennsylvania.
- Almost 45 percent worked in engineering service firms that do drafting work on a contract basis. Others were employed in manufacturing industries.

### Job Outlook

- Employment of drafters in Pennsylvania is expected to decrease from approximately 11,160 in 2004 to approximately 10,370 in 2014. About 314 annual openings will result from replacement needs. Although no net employment growth is expected statewide, growth openings may occur in some areas.
- Although industrial growth and increasingly complex design problems will increase the demand for drafting services, the increased use of CAD systems should offset this growth.
- Opportunities should be best for individuals who have at least two years of postsecondary training and considerable experience using CAD systems.

### Earnings

- In Pennsylvania, drafters averaged \$39,700 to \$45,600 annually in 2005. Entry-level drafters earned between \$27,700 and \$29,800, while experienced drafters earned anywhere from \$45,700 to \$53,900.
- The following table includes the average annual, entry level, and experienced level wages in 2005 for different drafters in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Architectural & Civil Drafters	\$39,740	\$27,750	\$45,730
Electrical & Electronics Drafters	\$45,540	\$28,990	\$53,810
Mechanical Drafters	\$45,240	\$29,720	\$53,000

### **Training, Other Qualifications and Advancement**

Employers are most interested in applicants who have completed postsecondary training in drafting and acquired a solid background in computer-aided drafting and design (CADD) techniques.

Individuals planning a career in drafting should take courses in computer technology, math, science, design, and computer graphics. Mechanical and visual aptitude is important. Aspiring drafters should be able to draw freehand and do detailed work accurately and neatly. In addition, they should have good interpersonal, communication, and problem-solving skills.

Many public and private schools provide training programs in drafting. However, prospective students should be careful in selecting a program, as the kind and quality varies considerably. Technical training obtained in the Armed Forces is highly rated, although some additional training may be required for civilian drafting jobs.

Entry-level or junior drafters perform routine work under close supervision. After gaining experience, junior drafters progress to more difficult work with less supervision. They may be required to exercise more judgment and perform calculations when preparing and modifying drawings. Many employers will pay for continuing education courses for their experienced drafters.

The American Design Drafting Association (ADDA) has established a voluntary certification program for drafters. Although most employers do not require certification, it demonstrates that nationally recognized standards have been met. Individuals who wish to become certified must pass the Drafter Certification Test, which evaluates knowledge and understanding of basic drafting concepts.

Experienced drafters may advance to senior drafter, designer or supervisory positions. With appropriate education, some workers become engineering technicians, engineers or architects. A few drafters go into business for themselves.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of drafters include architects, landscape architects, designers, engineers, engineering technicians, surveyors, cartographers, and science technicians.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Accrediting Commission of Career Schools and Colleges of Technology, 2101 Wilson Blvd., Suite 302, Arlington, VA 22201. Internet: <http://www.accsct.org>
- American Design Drafting Association, 105 E. Main St., Newbern, TN 38059. Internet: <http://www.adda.org>

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## Drywall Installers, Ceiling Tile Installers & Tapers

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SOC CODES: 47-2081 and 47-2082

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### Significant Points

- Employment growth will be slow, reflecting the slow growth of new construction and renovation.
- Most learn their skills on-the-job but some complete formal apprenticeship programs.
- Three-quarters worked for drywall contractors.

### Nature of the Work

- There are two kinds of drywall workers: installers and finishers. Drywall consists of a thin layer of gypsum between two layers of heavy paper. It is used for walls and ceilings in most buildings because it is faster and cheaper to install than plaster.  
*Installers*, also called *applicators*, measure, cut, and fasten drywall panels to the inside framework of buildings. Sometimes they must fit pieces around doors, windows, electrical outlets, and plumbing. Because drywall is heavy and cumbersome, a helper generally assists in the positioning and securing the panel.  
*Tapers*, or *finishers*, prepare drywall panels for painting by taping and finishing joints and imperfections. They can create a smooth surface or a textured surface.
- *Ceiling tile installers*, or *acoustical carpenters*, apply or mount acoustical tiles or blocks, strips, or sheets of shock absorbing material to ceilings and walls of buildings to reduce reflection of sound or to decorate rooms.
- *Lathers* fasten metal or rockboard lath to walls, ceilings, and patricians of buildings, which forms the support base for plaster, fireproofing, or acoustical materials.

### Working Conditions

- Drywall workers spend most of the day standing, bending or kneeling. Installers often lift and maneuver heavy panels, while finishers use stilts to tape and finish ceiling and angle joints.
- Hazards include injuries from power tools and falls from ladders and scaffolds.
- Because sanding creates a great deal of dust, some finishers wear masks for protection.

### Employment

- Drywall installers, ceiling tile installers and tapers held about 195,800 jobs in 2004 in the United States and approximately 2,630 jobs in Pennsylvania.
- Nearly 75 percent were employed with contractors specializing in drywall installation. About 15 percent were self-employed contractors.

### Job Outlook

- Employment of drywall installers, ceiling tile installers and tapers in Pennsylvania is expected to grow from approximately 2,630 in 2004 to approximately 2,740 in 2014. Drywall workers can expect about 11 openings due to growth and about 57 replacement openings for approximately 68 total annual openings.
- Additional job openings will be created by the rising demand for drywall work. However, employment growth will be slow, reflecting the slow growth of new construction and renovation.
- Employment of drywall workers is sensitive to fluctuations in the economy. Workers may experience periods of unemployment when the level of nonresidential construction activity falls.

### Earnings

- Average hourly earnings of drywall and ceiling tile installers in Pennsylvania were \$17.30 in 2005. The entry-level rate for a drywall and ceiling tile installer in 2005 was \$10.93 while an experienced installer made \$20.49.
- Average hourly earnings of tapers in Pennsylvania were \$19.51 in 2005. The entry-level rate for a taper in 2005 was \$13.43 while an experienced taper made \$22.55.

### Training, Other Qualifications and Advancement

Many drywall installers, ceiling tile installers and tapers learn their skills through on-the-job training. Installer helpers carry materials, clean up debris, and lift panels. As experience is gained, they are taught how to measure, cut, and install drywall. Finisher helpers tape joints and touch up imperfections. They soon learn how to install corner guards and how to conceal openings around pipes. At the end of their training, they learn to estimate the cost of installing and finishing drywall.

Some drywall workers take part in formal apprenticeship programs administered by union-management committees. The International Union of Painters and Allied Trades conducts a two-year apprenticeship program for drywall finishers. Local affiliates of the Associated Builders and Contractors and the Home Builders Institute often conduct training programs for non-union workers.

Employers prefer to hire high school graduates who are in good physical condition. Previous courses in carpentry provide a strong background. Regardless of educational background, they must be good at simple arithmetic.

Drywall workers with some experience and leadership ability may advance to supervisor positions. Others may start their own contracting businesses.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of drywall workers include carpenters, floor covering installers, insulation workers, plasterers, and stucco masons.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Associated Builders and Contractors, 4250 N. Fairfax Dr., 9<sup>th</sup> Fl., Arlington, VA 22203.  
Internet: <http://www.abc.org>
- Home Builders Institute, 1201 15<sup>th</sup> St., NW, 6<sup>th</sup> Fl., Washington, D.C. 20005.  
Internet: <http://www.hbi.org>
- International Union of Painters and Allied Trades, 1750 New York Ave. NW, Washington, DC 20006.  
Internet: <http://www.ibpat.org>
- United Brotherhood of Carpenters and Joiners of America, 101 Constitution Ave., NW, Washington, D.C. 20001. Internet: <http://www.carpenters.org>



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## Electricians

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SOC CODE: 47-2111

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### Significant Points

- Job opportunities for skilled workers are expected to be very good.
- Most electricians complete a formal apprenticeship program.
- More than half worked in the construction industry.

### Nature of the Work

- *Electricians* install, connect, test, and maintain electrical systems. They may also install and maintain the electronic controls for industrial equipment.
- When installing new systems, electricians must follow the National Electric Code and comply with State and local building codes. They often use blueprints, which indicate the location of circuits, outlets, load centers, and panel boards, to ease the installation process.
- Maintenance electricians spend much of their time in preventive maintenance. They periodically inspect equipment and correct any problems before breakdowns occur.
- Hand tools, power tools, and testing equipment are used to test and repair electrical systems.

### Working Conditions

- Most electricians work a standard 40-hour week, although overtime may be required. Those who provide maintenance work may have to work evening or weekend shifts and are usually on-call for emergencies.
- Electricians stand for long periods of time and frequently work on ladders and scaffolds. They may work in confined areas and are subject to uncomfortable conditions.
- Traveling to job sites is common. Some sites may be up to 100 miles away.
- Strict safety procedures must be followed to avoid injuries from electrical shock, falls, and cuts.

### Employment

- Electricians held about 656,200 jobs in 2004 in the United States and approximately 24,480 jobs in Pennsylvania.
- Almost 63 percent worked for building equipment contractors. About 1 in 15 were self-employed.

### Job Outlook

- Employment of electricians in Pennsylvania is expected to grow from approximately 24,480 in 2004 to approximately 26,040 in 2014. Electricians can expect about 156 openings due to growth and about 484 replacement openings for approximately 640 total annual openings.
- Job opportunities for skilled electricians are expected to be very good as the growth in demand outpaces the supply of workers trained in this craft. A shortage of skilled workers is expected during the next decade.
- Employment of construction electricians is sensitive to fluctuations in the economy. During economic downturns, job openings and apprenticeship opportunities for electricians are often less plentiful.

### Earnings

Average hourly earnings of electricians in Pennsylvania were \$24.29 in 2005. The entry-level rate for electricians in 2005 was \$14.61 while an experienced electrician made \$29.13.

### Training, Other Qualifications and Advancement

Most electricians complete an apprenticeship program. Some learn their skills through informal, on-the-job training. Apprenticeship programs give trainees a thorough knowledge of all aspects of the trade and generally improve their ability to find a job.

Apprenticeship programs usually last four to five years and combine on-the-job training with classroom instruction. Specialized training in welding, communications, fire alarm systems, cranes, and elevators is also provided. Applicants for apprentice positions must be at least 18 years old and have a high school diploma or equivalent.

Those who do not enter an apprenticeship program can learn the trade informally by working as a helper for an experienced electrician. Helpers learn to install conduit, connect wires, and test circuits. They also learn about safety practices. Many supplement their on-the-job training with trade school or correspondence courses.

Regardless of how one learns the trade, previous courses in mathematics, electricity, electronics, mechanical drawing, science, and shop provide a strong background. Special training offered in the Armed Forces and by post-secondary technical schools is also beneficial. Aspiring electricians should be in good health, fairly strong, and very agile. The ability to distinguish colors is important because electrical wires are frequently identified by color.

A number of municipalities in Pennsylvania require electricians to be licensed. Although licensing requirements can vary from area to area, most electricians must pass an examination that tests their knowledge of electrical theory, the National Electrical Code as well as local electric and building codes in order to obtain a license. Experienced electricians periodically take courses offered by their employer or union to keep abreast of changes in electrical codes, materials, or methods of installation.

Electricians who have gained enough experience can advance to supervisor positions and eventually superintendent positions. Some open their own contracting business, although this may require an electrical contractor's license.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of electricians include heating, air-conditioning, and refrigeration mechanics and installers; line installers and repairers; electrical and electronics installers and repairers; electronic home entertainment equipment installers and repairers; and elevator installers and repairers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Independent Electrical Contractors, Inc., 4401 Ford Ave., Suite 1100, Alexandria, VA 22302.  
Internet: <http://www.ieci.org>
- International Brotherhood of Electrical Workers (IBEW), 1125 15th St. NW, Washington, DC 20005.  
Internet: <http://www.ibew.org>
- Associated Builders and Contractors, 4250 N. Fairfax Dr., 9<sup>th</sup> Fl., Arlington, VA 22203.  
Internet: <http://www.abc.org>
- Home Builders Institute, 1201 15<sup>th</sup> St., 6<sup>th</sup> Fl., Washington, DC 20005.  
Internet: <http://www.hbi.org>

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## Elevator Installers & Repairers

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SOC CODE: 47-4021

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### Significant Points

- Elevator installers and repairers learn their trade through years of on-the-job training.
- Job prospects should be best for those with formal training in electronics.

### Nature of the Work

- *Elevator installers and repairers*, also called *elevator constructors* or *elevator mechanics*, assemble, install, replace, and repair elevators, escalators, dumbwaiters, moving walkways, and similar equipment.
- The most highly skilled elevator installers and repairers, called “adjusters,” specialize in fine-tuning the equipment after installation. They make sure that an elevator is working according to specifications.
- Elevator maintenance mechanics generally do preventive maintenance work. They also troubleshoot and may be called in to do emergency repairs.
- Modern elevators are almost all electronically controlled. Elevator mechanics must have a thorough knowledge of electronics, electricity, and hydraulics to install, repair, and maintain them.

### Working Conditions

- Most elevator installers and repairers work a standard 40-hour week. Maintenance and service mechanics often work overtime and are usually on-call for emergencies.
- Elevator installers and repairers spend most of their time working indoors, often in cramped spaces or awkward positions. They should be able to lift and carry heavy equipment and parts.
- Strict safety procedures must be followed to avoid injuries from electrical shock, muscle strains, falls, and cuts.

### Employment

- Elevator installers and repairers held about 21,900 jobs in 2004 in the United States and approximately 790 jobs in Pennsylvania.
- Over 65 percent worked for building equipment contractors. Others worked for wholesale trade companies and local government agencies.

### Job Outlook

- Employment of elevator installers and repairers in Pennsylvania is expected to grow from approximately 790 in 2004 to approximately 850 in 2014. Elevator installers and repairers can expect about 6 openings due to growth and about 19 replacement openings for approximately 25 total annual openings.
- Opportunities for new workers largely depend on activity in the construction industry. Job prospects should be best for those with formal training in electronics.
- Growth will also be driven by the need to continually modernize old equipment and to install increasingly sophisticated equipment.
- This occupation is less sensitive to changes in economic conditions because elevators, escalators, and other equipment must be kept in good working condition.

### Earnings

Average hourly earnings of elevator installers and repairers in Pennsylvania were \$26.10 in 2005. The entry-level rate in 2005 was \$16.31 while an experienced worker made \$31.00.

### Training, Other Qualifications and Advancement

Most elevator installers and repairers apply for their jobs through a local chapter of the International Union of Elevator Constructors. Applicants for trainee positions must be at least 18 years old, have a high school diploma or equivalent, and pass an aptitude test. Good physical health and mechanical aptitude also are important.

Joint training committees usually sponsor training programs that combine on-the-job training with classroom instruction. Classroom courses include electrical and electronic theory, mathematics, applications of physics, and safety. In non-union shops, independent contractors sponsor training programs.

After successful completion of a 6-month probationary period, trainees work toward becoming qualified elevator mechanics. Trainees must pass a standard mechanics examination as well as a licensing examination to become a qualified elevator mechanic. This process usually takes about four to five years. Practicing elevator

installers and repairers receive further training in order to become familiar with the company's particular equipment. Continual training is necessary to keep abreast of technological developments. Although voluntary, this training greatly improves one's chances for promotion.

Regardless of how one learns the trade, previous courses in electricity, mathematics, and physics provide a strong background. As elevators become more sophisticated, workers may find it necessary to acquire additional education with an emphasis on electronics. Those with formal education usually advance more quickly than their counterparts.

Some installers may receive further training in specialized areas and advance to mechanic-in-charge, adjuster, supervisor, or elevator inspector positions. Others move into management, sales, or product design jobs.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of elevator installers and repairers include boilermakers, electricians, industrial machinery repairers, structural and reinforcing metal workers, and sheet metal workers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- International Union of Elevator Constructors, 7154 Columbia Gateway Dr., Columbia, MD 21046.  
Internet: <http://www.iuec.org>

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## Glaziers

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SOC CODE: 47-2121

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### Significant Points

- Demand will be spurred by the need to modernize structures and a continuing emphasis on energy management.
- Most learn through informal, on-the-job training.

### Nature of the Work

- **Glaziers** are responsible for selecting, cutting, installing, replacing, and removing all types of glass. They may also work with plastics, granite, marble, and similar materials used as glass substitutes.
- For most jobs, the glass is precut and mounted in frames elsewhere. It arrives at the job site ready for glaziers to position and secure in place. For some jobs, the glazier must cut the glass manually at the job site.
- Once glaziers have the glass in place, they use mastic, putty, bolts, rubber gaskets, molding, glazing compound, or metal clips to secure the glass in place.
- Glaziers use power tools as well as hand tools. Many use computers in the shop or at the job site to improve their layout work and reduce the amount of glass that is wasted.

### Working Conditions

- Glaziers often spend their time working outdoors, sometimes in inclement weather.
- Excessive bending, kneeling, lifting, and standing are not uncommon.
- Safety measures must be taken to avoid injuries, falls or improper lifting of heavy glass panels.

### Employment

- Glaziers held about 49,200 jobs in 2004 in the United States and approximately 1,570 jobs in Pennsylvania.
- Over half worked for building construction contractors. Another 32 percent worked in automotive repair shops or were self-employed.

### Job Outlook

- Employment of glaziers in Pennsylvania is expected to grow from approximately 1,570 in 2004 to approximately 1,730 in 2014. Glaziers can expect about 15 openings due to growth and about 33 replacement openings for approximately 48 total annual openings.
- Demand for glaziers is spurred by the continuing need to modernize and repair existing structures as well as the popularity of glass in bathroom and kitchen design. A continuing emphasis on energy management, which encourages people to replace their old windows and doors, also spurs the demand for glaziers.
- Employment of glaziers is sensitive to changes in the economy. When the level of construction activity falls, glaziers can experience periods of unemployment.

### Earnings

Average hourly earnings of glaziers in Pennsylvania were \$20.13 in 2005. The entry-level rate for glaziers in 2005 was \$12.69 while an experienced glazier made \$23.85.

### Training, Other Qualifications and Advancement

Many glaziers learn the trade through informal, on-the-job training. As helpers, they usually carry glass, clean up debris, and assist on simple installation jobs. By working with experienced glaziers, helpers eventually acquire the skills of a fully qualified glazier.

Most employers recommend a formal apprenticeship program. Apprenticeship programs usually last three to four years and combine on-the-job training with related classroom instruction or home study. Classroom instruction includes courses in basic mathematics, blueprint reading, general construction techniques, safety practices, and first aid. Apprenticeship programs usually take less time and provide more complete training. However, opportunities for apprenticeships are declining.

Applicants must pass a mechanical aptitude test, be at least 17 years old, and be in good physical condition. High school or vocational school graduates are preferred. In fact those with previous course work in general mathematics, mechanical drawing, general construction, shop, electronics, and computers may have an advantage.

Because many glaziers are trained informally, the National Glass Association (NGA) offers a certification program. They offer a series of written examinations, which certify an individual's competency to perform glazier

work at three levels of proficiency. These levels include Level I - Glazier; Level II - Commercial Interior/Residential Glazier or Storefront/Curtainwall Glazier; and Level III - Master Glazier.

For most glaziers, advancement takes the form of higher wages. Some advance to supervisory positions. Others become self-employed contractors or estimators.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of glaziers include brickmasons, blockmasons, and stonemasons; carpenters; carpet, floor, and tile installers and finishers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; and painters and paperhangers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- The Glass Association of North America, 2945 SW Wanamaker Dr., Suite A, Topeka, KS 66614. Internet: <http://www.glasswebsite.com/>
- National Glass Association, 8200 Greensboro Dr., McLean, VA 22102. Internet: <http://www.glass.org>

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## Handlers, Equipment Cleaners, Helpers & Laborers

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SOC CODES: 47-2061, 47-3011, 47-3012, 47-3013, 47-3014, 47-3015, 47-3016, 47-5081, 49-9098, 51-9198, 53-6021, 53-6031, 53-7061, 53-7062, 53-7063, 53-7064 and 53-7081

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### Significant Points

- Most jobs are entry-level and require no formal training.
- Projected employment growth varies by occupation.

### Nature of the Work

- Handlers, equipment cleaners, helpers, and laborers (called general laborers going forward) perform tasks that are needed to make the work of skilled construction, maintenance, and production workers flow smoothly.
- To perform their jobs effectively, general laborers must be familiar with the work of those they are assisting.

*Construction craft laborers* provide much of the physically demanding labor at construction sites. They may prepare sites, dig trenches, mix concrete, or set explosives.

*Freight, stock, and material movers* use forklifts, dollies, carts, and manual power to move materials between storage and production areas.

*Hand packers and packagers* manually pack, package, or wrap a variety of materials. They may inspect items, label cartons, and stack packages.

*Helpers* assist skilled workers. They may fetch tools, hold materials, or clean work areas.

*Machine feeders and offbearers* are responsible for feeding or removing materials from machines.

*Parking lot attendants* assist customers in parking their cars and collect parking fees.

*Refuse and recyclable material collectors* gather trash, garbage, and recyclables from homes and businesses along a regularly scheduled route. They also transport the refuse to the dump, landfill, or recycling center.

*Service station attendants* fill fuel tanks and wash windshields on vehicles. They may perform simple repairs under the direction of a mechanic.

*Vehicle washers and equipment cleaners* use water and various cleaning equipment to maintain machinery, vehicles, storage tanks, pipelines, and similar equipment.

### Working Conditions

- Although work schedules vary with industry, most general laborers work 8-hour shifts. Early morning, evening, and “graveyard” shifts are common.
- General laborers do repetitive, physically demanding work. They may work at great heights or in tight, awkward places. Some laborers work outdoors in all weather conditions.
- These employees wear safety clothing and hard hats to avoid against injury. Because they may be exposed to harmful materials or chemicals, some workers wear protective devices over their eyes, mouth, and ears.

### Employment

- General laborers held about 6.2 million jobs in 2004 in the United States and approximately 253,580 jobs in Pennsylvania.
- Nearly one-quarter worked for manufacturing companies. About 18 percent were employed in the construction industry and roughly 17 percent in service-providing establishments.
- The following table includes the industry groups that employed the most general laborers in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Manufacturing	60,170	23.7%
Construction	44,660	17.6%
Services	41,910	16.5%
Retail Trade	36,600	14.4%
Transportation & Warehousing	27,800	11.0%

### Job Outlook

- Employment of general laborers in Pennsylvania is expected to decrease from approximately 253,580 in 2004 to approximately 252,670 in 2014. About 7,425 annual openings will result from replacement needs. Although no net employment growth is expected for general laborers, growth openings may occur in some specific occupations and certain regions.
- Equipment cleaners, hand packers, parking lot attendants, construction helpers, and refuse material collectors will have the best employment prospects. Service station attendants and machine feeders can expect declines in employment levels.
- Employment growth will be limited by automation, out-sourcing, and job combination. All of these factors increase productivity and improve quality control. As a result, many jobs will be eliminated.

### Earnings

- In Pennsylvania, general laborers averaged \$8.30 to \$15.10 per hour in 2005. Entry-level rates were between \$6.00 and \$9.40 per hour, while experienced laborers earned anywhere from \$9.40 to \$18.00 per hour.
- The following table includes the average hourly, entry level, and experienced level wages in 2005 for general laborers in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Construction Laborers	\$15.06	\$9.36	\$17.91
Helpers--Brick, Block & Stonemasons and Tile & Marble Setters	\$13.33	\$9.11	\$15.44
Helpers--Carpenters	\$10.93	\$8.29	\$12.25
Helpers--Electricians	\$12.52	\$8.08	\$14.74
Helpers--Painters, Paperhangers, Plasterers & Stucco Masons	\$11.30	\$7.61	\$13.15
Helpers--Pipelayers, Plumbers, Pipefitters & Steamfitters	\$12.00	\$8.71	\$13.65
Helpers--Roofers	\$10.85	\$7.88	\$12.34
Helpers--Extraction Workers	\$13.02	\$8.59	\$15.23
Helpers--Installation, Maintenance & Repair Workers	\$11.29	\$7.36	\$13.26
Helpers--Production Workers	\$11.40	\$7.74	\$13.23
Parking Lot Attendants	\$8.34	\$6.19	\$9.42
Service Station Attendants	\$8.32	\$6.00	\$9.48
Cleaners of Vehicles & Equipment	\$8.92	\$6.32	\$10.22
Laborers & Freight, Stock & Material Movers, Hand	\$11.61	\$7.65	\$13.59
Machine Feeders & Offbearers	\$12.07	\$8.29	\$13.97
Packers & Packagers, Hand	\$10.10	\$6.99	\$11.65
Refuse & Recyclable Material Collectors	\$13.82	\$8.63	\$16.41

### Training, Other Qualifications and Advancement

Most general laborer positions are entry-level and do not require a high school diploma or any previous experience. However, most employers prefer to hire those who are at least 18 years old and physically able to perform the work. Applicants may have to take a physical exam, pass a drug test, or undergo a background check prior to employment.

Workers must be reliable and hard working. Basic reading and math skills are needed to understand procedure manuals and collect payments from customers. Grocery store baggers, service station workers, and parking lot attendants should be pleasant and courteous when dealing with the public.

Although most general laborers learn their skills through on-the-job training, formal apprenticeship programs are available in construction trades. These programs, which combine on-the-job training with classroom instruction, provide overall preparation. Apprentices are taught how to properly handle all tools and equipment.



Before an apprentice is placed on the job, most union contractors require some hands-on training. Likewise, workers who must handle toxic chemicals or operate dangerous equipment often receive additional training in safety awareness and procedures.

Experienced laborers often become trainees for skilled construction, maintenance, and production positions. In fact, most employers prefer to fill open slots with qualified workers from within the company. Some general laborers are promoted to supervisory positions.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of general laborers include roustabouts, forest workers, logging equipment operators, and groundskeepers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- International Carwash Association, 401 N. Michigan Ave., Chicago, IL 60611.  
Internet: <http://www.carwashes.com>

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## Hazardous Materials Removal Workers

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SOC CODE: 47-4041

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### Significant Points

- All hazardous material removal workers must be licensed.
- Formal education beyond a high school diploma is not required.

### Nature of the Work

- Hazardous materials removal workers identify, remove, package, transport, and dispose of various hazardous materials, including asbestos, lead, radioactive, and nuclear materials. The removal process is also called abatement, remediation, and decontamination.
- Depending on the work at hand, workers use a variety of tools, equipment, and safety supplies. Different workers perform different tasks in removal process.

*Asbestos abatement and lead abatement workers* remove asbestos and lead from buildings scheduled for renovation or demolishing.

*Decontamination technicians* use brooms and mops to clean exposed areas and remove exposed items for decontamination or disposal.

*Radiation protection technicians* use radiation survey meters to locate and evaluate materials, operate cleaning equipment for decontamination, and package radioactive materials for transportation or disposal.

*Decommissioning and decontamination (D&D) workers* remove and treat radioactive materials generated by nuclear facilities and power plants.

*Treatment, storage, and disposal (TSD) workers* transport and prepare hazardous materials for treatment or disposal. They typically operate heavy machinery such as forklifts and earth moving machinery.

- Hazardous material removal work is very structured and may be planned out years in advance. There is a great deal of cooperation among supervisors and workers. Due to the nature of the materials being removed, work areas are restricted to licensed hazardous materials removal workers.

### Working Conditions

- Many hazardous materials removal workers work a standard 40-hour week. However, overtime and shift work is not uncommon.
- Asbestos and lead abatement workers tend to work in buildings and schools. TSD workers tend to work at landfills, incinerators, boilers, and industrial furnaces. D&D workers, decontamination technicians, and radiation protection technicians often work at nuclear facilities and electrical power plants.
- Great care is taken to ensure the safety of the work site. Some workers wear respirators and fully enclosed personal protective suits, which may be hot and uncomfortable. Individuals may experience claustrophobia.
- Hazardous materials removal workers may be required to travel outside their normal working area during emergency situations. These emergency cleanups may take several days or weeks to complete.

### Employment

- Hazardous materials removal workers held about 38,400 jobs in 2004 in the United States and approximately 780 jobs in Pennsylvania.
- Over 60 percent worked for companies that perform remediation, waste removal or architectural and engineering consulting services.
- The following table includes the industries that employed the most hazardous materials removal workers in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
Remediation & Other Waste Services	290	37.6%
Architectural & Engineering Services	200	25.3%
Power Generation & Supply	60	8.1%
General Freight Trucking	60	7.7%

### **Job Outlook**

- Employment of hazardous materials removal workers in Pennsylvania is expected to grow from approximately 780 in 2004 to approximately 850 in 2014. Hazardous materials removal workers can expect about 7 openings due to growth and about 21 replacement openings for approximately 28 total annual openings.
- Employment of decontamination technicians, radiation safety technicians, and D&D workers is expected to grow due to the increased pressure for safer and cleaner nuclear and electric generator facilities. In addition, the number of closed facilities that need decommissioning may continue to grow. Job opportunities will be best for lead abatement workers.
- Unlike other construction occupations, employment for hazardous materials removal workers is less affected by slowdowns in the economy.

### **Earnings**

Average hourly earnings of hazardous materials removal workers in Pennsylvania were \$17.12 in 2005. The entry-level rate for hazardous materials removal workers in 2005 was \$12.38 while an experienced worker made \$19.49.

### **Training, Other Qualifications and Advancement**

Formal education beyond a high school diploma is not required to become a hazardous materials removal worker. However, federal regulations do require licensure. Workers should also be able to perform basic mathematical conversions and calculations. They must have good physical strength and manual dexterity.

Asbestos, lead abatement, and TSD workers must complete a 32- to 40-hour training program in order to obtain their license. This program covers health hazards, personal protective equipment, hazard recognition and identification, site safety, and decontamination. In some cases, workers will discover one hazardous material while abating another. If they are not licensed to work with the newly discovered material, the worker cannot continue. Many experienced workers opt to take courses in additional disciplines to counteract this problem.

For D&D workers employed at nuclear facilities, training is more extensive. In addition to the standard training course, workers must take courses on regulations governing nuclear materials and radiation safety. These courses add up to approximately three months of training, although most are not taken consecutively.

Many agencies, organizations, and companies provide training programs that are approved by the Environmental Protection Agency, the Department of Energy, and other regulatory bodies. Hazardous materials removal workers in all fields are required to take refresher courses every year to maintain their license(s).

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of hazardous materials removal workers include electric power generating plant operators, water and wastewater treatment plant operators, bricklayers, stonemasons, concrete masons, terrazzo workers, insulation workers, and sheet metal workers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Laborers-AGC Education and Training Fund, 37 Deerfield Rd., PO Box 37, Promfret, CT 06259. Internet: <http://www.laborers-agc.org>

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## Heating, Air-Conditioning & Refrigeration Mechanics & Installers

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SOC CODE: 49-9021

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### Significant Points

- Job prospects should be very good for skilled workers.
- Employers prefer to hire applicants with technical school or apprenticeship training.
- Most worked for heating and cooling contractors.

### Nature of the Work

- Heating, air-conditioning and refrigeration mechanics and installers, also called HVAC technicians, install, maintain, and repair systems that control the temperature, humidity, and air quality in buildings as well as systems that make it possible to store and transport food, medicine, and other perishable items.
- Although trained to do both, HVAC technicians often specialize in either installation or maintenance. Some specialize in one type of equipment. Those working for smaller operations tend to do installation and service work on heating, cooling, and refrigeration equipment.

*Furnace installers*, also called *heating equipment technicians*, install heating systems. They also perform routine maintenance work to keep the system operating efficiently.

*Air-conditioning technicians* and *refrigeration technicians* install and service central air-conditioning systems and a variety of refrigeration equipment respectively. Technicians test parts such as compressors, relays, and thermostats to diagnose problems and make repairs.

- HVAC technicians are adept at using a variety of tools. They must use care to conserve, recover, and recycle chlorofluorocarbon (CFC) and hydro-chlorofluorocarbon (HCFC), which contribute to the depletion of the ozone layer.

### Working Conditions

- HVAC technicians usually work a 40-hour week. Overtime work may be required during peak seasons. Maintenance workers often work evening or weekend shifts and are on-call 24 hours a day.
- Technicians may be assigned to specific job sites at the beginning of each day or they may be dispatched to jobs by radio, telephone, or pager.
- Work locations may be uncomfortable due to temperature or equipment location. Sometimes technicians are required to work in high places.
- Hazards include electrical shock, burns, and muscle strains. Additional safety procedures are necessary when handling refrigerants

### Employment

- HVAC technicians held about 269,700 jobs in 2004 in the United States and approximately 12,650 jobs in Pennsylvania.
- About 42 percent were employed with heating and cooling contractors. Another 20 percent were self-employed or working for retail fuel dealers.

### Job Outlook

- Employment of HVAC technicians in Pennsylvania is expected to grow from approximately 12,650 in 2004 to approximately 13,900 in 2014. These workers can expect about 125 openings due to growth and about 168 replacement openings for approximately 293 total annual openings.
- Job prospects for highly skilled HVAC technicians are expected to be very good. Those with technical school or formal apprenticeship training will have the best opportunities.
- Technicians who specialize in installation work may experience periods of unemployment when the level of new construction activity declines but repair work usually remains relatively stable.
- Concern for the environment and energy conservation should lead to the replacement of older systems and the installation of newer, more efficient systems in existing homes and buildings.

### Earnings

Average hourly earnings of HVAC technicians in Pennsylvania were \$19.15 in 2005. The entry-level rate for HVAC technicians in 2005 was \$13.11 while an experienced HVAC technician made \$22.17.

### **Training, Other Qualifications and Advancement**

Employers prefer to hire technicians with technical school or apprenticeship training. However, a sizable number still learn the trade informally, on the job.

Formal training programs can last anywhere from six months to two years and are offered at many technical schools, trade schools, junior colleges, community colleges, and through the Armed Forces. Students learn the basics of installation, maintenance, and repair. They also study theory, design, and equipment construction.

Trade associations frequently offer formal apprenticeship programs. These programs normally last three or four years and combine on-the-job training with classroom instruction. Applicants for these programs must have a high school diploma or equivalent.

Technicians who purchase or work with refrigerants must be certified in their proper handling. To become certified, technicians must pass a written examination specific to the type of work in which they specialize. Exams are administered by organizations approved by the Environmental Protection Agency.

Courses in shop math, mechanical drawing, applied physics, applied chemistry, electronics, blueprint reading, and computer applications provide a strong background for those interested in entering this occupation. Some knowledge of plumbing or electrical work is also helpful. Technicians should be courteous, tactful, and in good physical condition.

For most HVAC technicians, advancement takes the form of higher wages. Some become supervisors or service managers. Others move into areas such as sales and marketing. A few open their own contracting business.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of HVAC technicians include boilermakers, home appliance repairers, electricians, sheet-metal workers, pipelayers, plumbers, pipefitters, and steamfitters.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Air Conditioning Contractors of America, 2800 Shirlington Rd., Suite 300, Arlington, VA 22206. Internet: <http://www.acca.org>
- North American Technician Excellence (NATE), 4100 N. Fairfax Dr., Suite 210, Arlington, VA 22103. Internet: <http://www.natex.org>
- National Association of Plumbing-Heating-Cooling Contractors, 180 S. Washington St., PO Box 6808, Falls Church, VA 22040. Internet: <http://www.phccweb.org>
- Air Conditioning and Refrigeration Institute, 4100 N. Fairfax Dr., Suite 200, Arlington, VA 22203. Internet: <http://www.ari.org>
- Heating, Air-conditioning, and Refrigeration Distributors International, 1389 Dublin Rd., Columbus, OH 43215. Internet: <http://www.hardinet.org>

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## Insulation Workers

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SOC CODE: 47-2131 and 47-2132

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### Significant Points

- Concerns about the efficient use of energy will result in increased demand for insulation workers.
- Most learn their trade through informal, on-the-job training.
- About 1 in 15 were self-employed.

### Nature of the Work

- **Insulation workers** install the materials used to insulate buildings and equipment. They fasten the insulation with adhesive, staples, tape, or wire bands. Sometimes they cover an insulated pipe with sheet metal to protect the insulation from weather conditions or physical abuse.
- During new construction, insulation workers staple insulation to exterior walls and ceilings before drywall, paneling, or plaster walls are put in place. In major renovations of old buildings, insulation workers must first remove the old insulation.
- Common hand tools, power saws, welding machines, and compressors are used to install insulation.

### Working Conditions

- Insulation workers generally work indoors. However, dust, dirt, and heat can make conditions uncomfortable.
- Most of the day is spent standing, bending, or kneeling. Some workers spend time on ladders or in tight spaces.
- Strict safety guidelines must be followed in order for insulation workers to protect themselves from the dangers of insulating irritants, which can irritate the eyes, skin, and respiratory system.

### Employment

- Insulation workers held about 61,200 jobs in 2004 in the United States and approximately 1,790 jobs in Pennsylvania.
- Almost 85 percent were employed in the construction industry, primarily with insulation contractors and masonry companies. Others were self-employed or working for hardware and plumbing wholesalers.

### Job Outlook

- Employment of insulation workers in Pennsylvania is expected to remain steady at approximately 1,790 through 2014. About 55 annual openings will result from replacement needs. Although no net employment growth is expected statewide, growth openings may occur in some areas.
- Concerns about the efficient use of energy to heat and cool buildings will increase the demand for insulation workers. Efforts to improve insulation in existing structures will also increase demand.
- Employment of insulation workers in the construction industry is sensitive to changes in the economy. When the level of construction activity falls, these workers may experience periods of unemployment. Insulation workers employed in industrial plants generally have more stable employment because maintenance and repair must be done on a continuing basis.

### Earnings

- Average hourly earnings of floor, ceiling and wall insulation workers in Pennsylvania were \$16.90 in 2005. The entry-level rate for these insulation workers in 2005 was \$12.32 while an experienced worker made \$19.18.
- Average hourly earnings of mechanical insulation workers in Pennsylvania were \$28.41 in 2005. The entry-level rate for these insulation workers in 2005 was \$20.95 while an experienced worker made \$32.14.

### Training, Other Qualifications and Advancement

Most insulation workers learn their trade through informal, on-the-job training, although some complete formal apprenticeship programs. Regardless of how one learns the trade, employers prefer to hire high school graduates who are in good physical condition and have a license to drive. Those with previous courses in blueprint reading, shop math, sheet-metal layout, and general construction may have an advantage.

On-the-job training can take up to two years. Learning to install insulation in homes generally requires less training than commercial and industrial buildings. As they gain experience, trainees often receive less supervision, more responsibility, and higher pay.

Applicants seeking apprenticeship positions must be at least 18 years old and have a high school diploma or its equivalent. Typical programs last about four years, combine on-the-job training with classroom instruction and are sponsored by a joint training committee. To complete their training, apprentices must pass practical and written tests to demonstrate their insulation knowledge.

Skilled insulation workers may advance to supervisor, shop superintendent, or insulation contract estimator positions. Some open their own contracting business.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of insulation workers include carpenters, carpet installers, drywall installers, floor layers, roofers, sheet-metal workers, and duct installers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Insulation Contractors Association of America, 1321 Duke St., Suite 303, Alexandria, VA 22314.  
Internet: <http://www.insulate.org>

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## Material Moving Equipment Operators

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SOC CODES: 53-7011, 53-7021, 53-7031, 53-7032, 53-7033, 53-7041, 53-7051, 53-7071, 53-7072, 53-7073, 53-7111 and 53-7121

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### Significant Points

- Necessary skills are acquired through on-the-job training programs.
- Job growth will depend on the employing industry.

### Nature of the Work

- Material moving equipment operators use machinery to move construction materials, earth, petroleum products, and other heavy materials. They may also load or unload trucks, ships, and railroad cars.
- Unique skills are needed to operate different pieces of equipment.
  - Industrial truck and tractor operators* use machinery equipped with lifting devices to carry loads. They also pull trailers loaded with materials, goods, or equipment.
  - Excavation and loading machine operators* control machinery that is equipped with scoops, shovels, or buckets to excavate sand, gravel, and earth. They also load materials into trucks or onto conveyors.
  - Crane and tower operators* use equipment that lifts materials, machinery, and other heavy objects with a hook that is attached to a load line.
  - Hoist and winch operators* control the movement of cables, cages, and platforms to move workers and materials for industrial operations.
- Most equipment operators keep records of the materials that they have moved. They are also responsible for cleaning, fueling, and servicing their machinery.

### Working Conditions

- Material moving equipment operators usually work outdoors, through all weather conditions. However, most industrial truck and tractor operators work in warehouses or manufacturing plants.
- Machinery can be very noisy. It can also shake or jolt the operator.
- To reduce the risk of injury, proper operating procedures must be followed at all times. Workers must adhere to strict safety guidelines and use safety equipment when it is available.

### Employment

- Material moving equipment operators held about 876,900 jobs in 2004 in the United States and approximately 41,170 jobs in Pennsylvania.
- Although found in many different industries, the majority were employed with manufacturing establishments. Others worked in the transportation, wholesale trade, mining, and construction industries.
- The following table includes the industry groups that employed the most material moving equipment operators in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Manufacturing	14,400	35.0%
Transportation & Warehousing	12,600	30.6%
Trade	5,940	14.4%
Mining	2,310	5.6%

### Job Outlook

- Employment of material moving equipment operators in Pennsylvania is expected to increase from approximately 41,170 in 2004 to approximately 44,820 in 2014. These operators can expect about 405 openings due to growth and about 848 replacement openings for approximately 1,253 total annual openings.
- An increased demand for material moving equipment operators will stem from an expanding economy and increased spending on infrastructure. However, equipment improvements continue to raise worker productivity and moderate the demand for skilled operators.



- Above average employment growth is expected in construction companies, temporary help organizations, and equipment leasing companies. However, fewer operators will be needed in the manufacturing industry.
- The construction and manufacturing industries are sensitive to changes in economic conditions. Therefore, the number of job openings in these industries may fluctuate from year to year.

### Earnings

- In Pennsylvania, material moving equipment operator wages averaged \$28,300 to \$44,700 annually in 2005. Entry-level wages were between \$19,400 and \$32,800, while experienced operators earned anywhere from \$31,300 to \$50,600.
- The following table includes the average annual, entry level, and experienced level wages in 2005 for different material moving equipment operators in Pennsylvania.

Occupational Title	Average Annual Wage	Entry Level Wage	Experienced Level Wage
Conveyor Operators & Tenders	\$28,830	\$22,200	\$32,140
Crane & Tower Operators	\$36,600	\$26,590	\$41,610
Dredge Operators	\$29,360	\$25,480	\$31,310
Excavating & Loading Machine & Dragline Operators	\$30,370	\$20,590	\$35,250
Loading Machine Operators, Underground Mining	\$36,830	\$29,020	\$40,740
Hoist & Winch Operators	\$38,600	\$23,400	\$46,210
Industrial Truck & Tractor Operators	\$29,260	\$22,170	\$32,800
Gas Compressor & Gas Pumping Station Operators	\$44,660	\$32,780	\$50,600
Pump Operators	\$36,600	\$27,290	\$41,260
Wellhead Pumpers	\$29,750	\$24,980	\$32,130
Shuttle Car Operators	\$38,990	\$31,300	\$42,830

### Training, Other Qualifications and Advancement

Employers prefer to hire high school graduates for entry-level material moving equipment operator positions. Necessary skills are acquired through on-the-job training programs. These programs enable apprentices and trainees to operate light equipment under the guidance of an experienced worker. As experience is gained, these workers move on to heavier equipment, such as cranes.

Although most operators receive no formal training, there are some vocational schools that offer instruction in the operation of material moving equipment. Graduates of these programs may have an advantage when looking for an apprenticeship or trainee position. Before starting any formal training program, the reputation of the school should be checked amongst employers in the area.

Material moving equipment operators need a good sense of balance and eye-hand-foot coordination. They should also be able to accurately judge distance. Mechanical aptitude and prior training in mechanics may be helpful because workers may have to maintain their machines. Previous experience operating mobile equipment, such as in the Armed Forces, is also an asset.

### Related Occupations

Workers in other occupations with responsibilities and duties related to those of material moving equipment operators include railroad yard workers, construction equipment operators, farm equipment operators, truck drivers, and bus drivers.

### Sources of Additional Information

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Specialized Carriers and Rigging Association, 2750 Prosperity Ave., Suite 620, Fairfax, VA 22301-4312. Internet: <http://www.scranet.org>

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## Painters & Paperhangers

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SOC CODE: 47-2141 and 47-2142

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### Significant Points

- Most learn their trade through informal, on the job training.
- Opportunities for jobs should be good due to high turnover rates.
- One-third were self-employed.

### Nature of the Work

- **Painters** apply paint, stain, varnish, and other finishes to buildings and other structures. They prepare the surface, apply a primer or sealer coat, and finally paint, stain, or varnish the surface. Painters also mix paints and match colors.
- Different painting jobs require different tools. A painter must choose the correct color and type of paint or varnish as well as the proper applicator.
- **Paperhangers** cover walls and ceilings with decorative wall coverings made of paper, vinyl, or fabric. First, they prepare the surface. Next, they must prepare the paste or other adhesive that will be used to hang the new covering. After measuring the area, paperhangers must check the covering for flaws and cut it into the proper sized strips. Finally, they hang and smooth the covering strips.

### Working Conditions

- Most painters and paperhangers work 40 hours a week or less. About 1 in 10 work part-time.
- Painters often work outdoors but seldom in wet, cold, or inclement weather.
- Workers spend most of their day standing, climbing, bending, and reaching over their heads.
- Painters and paperhangers risk injury from slips or falls. They may sometimes work with materials that can be hazardous if masks are not worn or if ventilation is poor.

### Employment

- Painters and paperhangers held about 485,600 jobs in 2004 in the United States and approximately 12,900 jobs in Pennsylvania.
- Contractors engaged in new construction and repair, restoration or remodeling work employed over 38 percent. Another 34 percent were self-employed.

### Job Outlook

- Employment of painters and paperhangers in Pennsylvania is expected to grow from approximately 12,900 in 2004 to approximately 13,940 in 2014. Painters and paperhangers can expect about 104 openings due to growth and about 194 replacement openings for approximately 298 total annual openings.
- Many people work as painters or paperhangers for a short period of time and then move on to other work.
- Employment in the construction industry is sensitive to changes in the economy. When the level of construction activity falls, painters and paperhangers may experience periods of unemployment. However, remodeling, restoration, and maintenance projects provide jobs even when new construction activity declines.

### Earnings

- Average hourly earnings of painters in Pennsylvania were \$17.13 in 2005. The entry-level rate for painters in 2005 was \$10.75 while an experienced painter made \$20.31.
- Average hourly earnings of paperhangers in Pennsylvania were \$16.69 in 2005. The entry-level rate for paperhangers in 2005 was \$10.92 while an experienced paperhanger made \$19.56.

### Training, Other Qualifications and Advancement

Training authorities recommend apprenticeship programs as the best way to learn painting and paperhanging. However, most painters learn through informal, on-the-job training as a helper. Few opportunities exist for paperhanger helpers.

Typical apprenticeship programs last three to four years and combine on-the-job training with classroom instruction. Apprentices receive instruction in color harmony, use and care of equipment, surface preparation, application techniques, paint mixing and matching, different finish characteristics, blueprint reading, wood finishing, and safety.

Applicants must be at least 16 years old and in good physical condition. A high school education or its equivalent is usually required to enter an apprenticeship program. Previous courses in mathematics may be beneficial. Manual dexterity and good color sense are important qualities for painters and paperhangers.

Painters and paperhangers may advance to supervisory or estimating jobs with painting and decorating contractors. Many establish their own painting and decorating businesses.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of painters and paperhangers include carpenters; carpet, floor, and tile installers and finishers; drywall installers, ceiling tile installers, and tapers; and plasterers and stucco masons.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Associated Builders and Contractors, 4250 N. Fairfax Dr., 9th Fl., Arlington, VA 22203.  
Internet: <http://www.abc.org>
- International Union of Painters and Allied Trades, 1750 New York Ave. NW, Washington, DC 20006.  
Internet: <http://www.ibpat.org>
- Home Builders Institute, 1201 15th Street NW, 6<sup>th</sup> Fl., Washington, DC 20005.  
Internet: <http://www.hbi.org>

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## Pipelayers, Plumbers, Pipefitters & Steamfitters

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SOC CODE: 47-2151 and 47-2152

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### Significant Points

- Job opportunities for skilled workers should be very good.
- Most learn their trade through formal apprenticeship programs.
- About one in 12 were self-employed.

### Nature of the Work

- Pipelayers, plumbers, pipefitters and steamfitters (referred to as plumbing workers going forward) install, maintain, and repair many different types of pipe systems. Workers generally specialize in one of these areas.
  - Pipelayers* lay clay, concrete, plastic, or cast-iron pipe for drains, sewers, water mains, and oil or gas lines.
  - Plumbers* install and repair the water, waste disposal, drainage, and gas systems in homes and buildings. They also install plumbing fixtures and appliances.
  - Pipefitters* install and repair high and low-pressure pipe systems. They also install automatic controls used to regulate these systems.
  - Steamfitters* install pipe systems that move liquids or gases under high pressure.
  - Sprinkler fitters* install automatic fire sprinkler systems in buildings.
- Depending on the type of project, many different materials and construction techniques are used. However, all plumbing workers must be able to read building plans or blueprints, follow instructions, lay out the job, and work efficiently with the materials and tools of the trade.
- Computers are often used to create blueprints and plan layouts.

### Working Conditions

- A 40-hour week is common for plumbing workers. Those involved in maintenance may have to work evening or weekend shifts, be on-call in case of emergencies, and travel between work sites.
- Plumbing workers may have to work outdoors, sometimes in inclement weather.
- Workers need physical strength as well as stamina to lift heavy pipes, stand for long periods of time, and work in uncomfortable or cramped positions.
- Safety procedures must be followed to avoid falls, burns, and cuts.

### Employment

- Plumbing workers held about 561,000 jobs in 2004 in the United States and approximately 19,560 jobs in Pennsylvania.
- Most worked for plumbing, heating and air conditioning contractors. About one in 12 were self-employed.

### Job Outlook

- Employment of plumbing workers in Pennsylvania is expected to grow from approximately 19,560 in 2004 to approximately 21,310 in 2014. These workers can expect about 175 openings due to growth and about 450 replacement openings for approximately 625 total annual openings.
- Job opportunities for skilled plumbing workers are expected to be very good as the growth in demand outpaces the supply of workers trained in this craft.
- Employment in the construction industry is sensitive to changes in the economy. When the level of construction activity falls, workers may experience periods of unemployment. However, remodeling, restoration, and maintenance projects often provide many jobs even when new construction activity declines.

### Earnings

- Average hourly earnings of pipelayers in Pennsylvania were \$16.57 in 2005. The entry-level rate in 2005 was \$11.15 while an experienced worker made \$19.27.
- Average hourly earnings of plumbers, pipefitters, and steamfitters in Pennsylvania were \$23.06 in 2005. The entry-level rate in 2005 was \$15.48 while an experienced worker made \$26.86.

### Training, Other Qualifications and Advancement

Plumbing workers, in general, undergo some type of apprenticeship training. However, a few still learn their skills through informal, on-the-job training.

Apprenticeship programs, both union and non-union sponsored, last four to five years and combine on-the-job training with classroom instruction. Classroom subjects include safety, drafting, blueprint reading, mathematics, applied physics, applied chemistry, and local plumbing regulations. These programs provide trainees with a thorough knowledge of all aspects of the trade.

When hiring helpers and apprentices, employers prefer high school graduates who are at least 18 years old and in good physical condition. Those with previous course work in shop, plumbing, general mathematics, drafting, blueprint reading, computers, and physics may have an advantage. Special training offered in the Armed Forces is also beneficial.

Plumbing workers must be licensed. Although licensing requirements vary, most workers must pass an examination that tests their knowledge of the trade as well as local plumbing codes.

Some plumbing workers advance to supervisor positions. Others become self-employed contractors.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of plumbing workers include boilermakers; electricians; elevator installers and repairers; heating, air-conditioning, and refrigeration mechanics and installers; industrial machinery repairers; sheet-metal workers; stationary engineers; and boiler operators.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Home Builders Institute, 1201 15<sup>th</sup> St. NW, 6<sup>th</sup> Fl., Washington, DC 20005.  
Internet: <http://www.hbi.org>
- Plumbing-Heating-Cooling Contractors Association, 180 S. Washington St., PO Box 6808, Falls Church, VA 22040. Internet: <http://www.phccweb.org>
- Associated Builders and Contractors, 4250 N. Fairfax Dr., 9<sup>th</sup> Fl., Arlington, VA 22203.  
Internet: <http://www.abc.org>
- National Fire Sprinkler Association, PO Box 1000, Patterson, NY 12563. Internet: <http://www.nfsa.org>
- American Fire Sprinkler Association (AFSA), 9626 Skillman St., Suite 300, Dallas, TX 75243-8264.  
Internet: <http://www.sprinklernet.org>
- Mechanical Contractors Association of America, 1385 Piccard Dr., Rockville, MD 20850.  
Internet: <http://www.mcaa.org>

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## Plasterers & Stucco Masons

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SOC CODE: 47-2161

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### Significant Points

- Most learn their trade through on-the-job training or formal apprenticeship programs.
- Job outlook can fluctuate based on the economy.
- The vast majority work for contractors or construction firms.

### Nature of the Work

- **Plasterers** apply plaster to interior walls and ceilings to form fire-resistant and relatively soundproof surfaces. They may install pre-fabricated exterior insulation systems and cast ornamental designs in plaster.
- Some plasterers do complex decorative and ornamental work that requires special skill and creativity
- **Stucco masons** apply durable plasters and stucco to exterior surfaces. They may also embed marble or gravel chips into the finish coat to achieve a pebble-like, decorative finish.

### Working Conditions

- Most plasterers and stucco masons work indoors. However, some outside work may be required when applying stucco or exterior wall insulation.
- Workers spend most of their day standing, climbing, bending, and reaching over their heads.
- Dust and dirt can irritate the skin and eyes and make plasterers and stucco masons very uncomfortable. It can also ruin shoes and clothing.

### Employment

- Plasterers and stucco masons held about 59,500 jobs in 2004 in the United States and approximately 1,710 jobs in Pennsylvania.
- Most worked for masonry, stonework and plastering contractors.

### Job Outlook

- Employment of plasterers and stucco masons in Pennsylvania is expected to grow from approximately 1,710 in 2004 to approximately 1,790 in 2014. Plasterers and stucco masons can expect about 8 openings due to growth and about 31 replacement openings for approximately 39 total annual openings.
- Employment of plasterers is expected to continue growing as a result of the appreciation for the durability and attractiveness that troweled finishes provide.
- Most plasterers and stucco masons work in construction, where prospects fluctuate from year to year due to changing economic conditions. Those working on exterior jobs may lose time during bad weather because materials cannot be applied under wet or freezing conditions.

### Earnings

Average hourly earnings of plasterers and stucco masons in Pennsylvania were \$18.29 in 2005. The entry-level rate in 2005 was \$13.06 while an experienced plasterer and stucco mason made \$20.91.

### Training, Other Qualifications and Advancement

Most employers recommend apprenticeship programs as the best way to learn plastering techniques. However, most learn through informal, on-the-job training as a helper. Apprentices and helpers must be at least 17 years old and in good physical condition. High school graduates are preferred. In fact, those with previous course work in general mathematics or mechanical drawing may have an advantage.

Joint training committees usually sponsor apprenticeship programs, which last two to three years and combine on-the-job training with classroom instruction. Apprentices receive instruction in drafting, blueprint reading, mathematics for layout work, cost and material estimation, uses of plaster, and ornamental casting. Some programs allow individuals to obtain training in related occupations, such as cement masonry and bricklaying.

Plasterers and stucco masons may advance to supervisor, superintendent, or contract estimator positions. Some become self-employed contractors.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of plasterers and stucco masons include brickmasons, blockmasons, and stonemasons; cement masons, concrete finishers, segmental pavers, and terrazzo workers; and drywall installers, ceiling tile installers, and tapers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Operative Plasterers' and Cement Masons' International Association of the United States and Canada, 14405 Laurel Pl., Suite 300, Laurel, MD 20707. Internet: <http://www.opcmia.org>

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## Roofers

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SOC CODE: 47-2181

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### Significant Points

- Job opportunities should be plentiful.
- Roofing has the highest accident rate of all construction occupations.
- Roughly one in six were self-employed.

### Nature of the Work

- **Roofers** repair and install roofs made of tar, asphalt, gravel, rubber, thermoplastic, metal, or shingles. They may also waterproof foundation walls and floors.
- There are two types of roofs: flat and pitched. Commercial and industrial buildings usually have flat roofs and houses have pitched, or sloped, roofs. Some roofers work on both types while others specialize.
  - Flat roofs are usually covered with several layers of materials, which seal and make the surface watertight. Some are covered with a single-ply membrane of waterproof compound instead. The top layer is either glazed to make a smooth finish or embedded with gravel for a rough surface.
  - Pitched roofs are generally covered with shingles. Roofers lay, cut, and tack 3-foot strips of roofing felt over the entire roof. Starting from the bottom edge, they nail overlapping rows of shingles to the roof. Finally, exposed nail heads are covered with roofing cement or caulking to prevent water leakage.
- Some roofers also waterproof and dampproof masonry and concrete walls and floors. To prepare surfaces for waterproofing, rough spots are removed and the waterproofing material is applied. When dampproofing, they usually spray a bitumen, or tar-based, coating on interior or exterior surfaces.

### Working Conditions

- When making repairs, roofers may have to work outdoors during inclement weather.
- Roofing work is very strenuous. Workers spend most of their day lifting, climbing, bending, and kneeling.
- Safety procedures must be followed to avoid burns, slips, and falls. The roofing industry has the highest accident rate of all construction industries.

### Employment

- Roofers held about 161,600 jobs in 2004 in the United States and approximately 5,550 jobs in Pennsylvania.
- Over 70 percent worked for roofing contractors. Another 10 percent worked in other construction industries. About 1 in 6 were self-employed.

### Job Outlook

- Employment of roofers in Pennsylvania is expected to grow from approximately 5,550 in 2004 to approximately 6,340 in 2014. Roofers can expect about 79 openings due to growth and about 129 replacement openings for approximately 208 total annual openings.
- Job opportunities should be plentiful, especially during the spring and summer months. Turnover is high because roofing work is hot, strenuous, and dirty. Also, many workers treat roofing as a temporary job until something better comes along.
- About 75 percent of roofing work is repair and re-roofing, a higher proportion than in most other construction work. As a result, demand for roofers is less susceptible to downturns in the economy.

### Earnings

Average hourly earnings of roofers in Pennsylvania were \$15.96 in 2005. The entry-level rate for a roofer in 2005 was \$10.35 while an experienced roofer made \$18.77.

### Training, Other Qualifications and Advancement

Most roofers acquire their skills informally by working as helpers. Helpers carry equipment and materials for experienced roofers. They also erect scaffolding and hoists. Within two or three months, they are taught to measure, cut, and fit roofing materials. Later they learn how to lay asphalt and fiberglass shingles. Because some materials are used infrequently, it can take several years to gain experience with all types of roofing.

Some roofers attend apprenticeship programs sponsored by joint training committees. Typical programs last three years and combine on-the-job training with classroom instruction. Classroom subjects include tool use,



arithmetic, and safety. Apprentices may also learn to dampproof and waterproof walls. On-the-job training is more structured for apprentices than for helpers.

When hiring helpers and apprentices, employers prefer high school graduates who are at least 18 years old. Roofers must be in good physical condition and have good balance. Those with previous course work in mechanical drawing and basic mathematics may have an advantage.

Experienced roofers can advance to supervisor or contract estimator positions. Others may become self-employed contractors.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of roofers include carpenters, floor covering installers, cement masons, concrete finishers, drywall installers and finishers, plasterers and stucco masons, terrazzo workers, and tile setters.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- National Roofing Contractors Association, 10255 W. Higgins Rd., Suite 600, Rosemont, IL 60018. Internet: <http://www.nrca.net>
- United Union of Roofers, Waterproofers, and Allied Workers, 1660 L St. NW, Suite 800, Washington, DC 20036. Internet: <http://www.unionroofers.com>

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## Sheet Metal Workers

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SOC CODE: 47-2211

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### Significant Points

- Strong demand for energy-efficient systems will fuel occupational growth.
- Opportunities will be best for individuals with formal apprenticeship training.
- Unlike many construction trades, few sheet metal workers were self-employed.

### Nature of the Work

- *Sheet metal workers* fabricate, install, and maintain duct systems and many other building products made from metal sheets. Some also work with fiberglass and plastic materials.
- Products are often pre-made away from the construction site. Sheet metal is measured, cut, bent, shaped, and fastened together. The pre-made parts are then taken to the site where they are further assembled and installed.
- An increasing number of sheet metal workers use computerized metalworking equipment to make layouts and cut or form parts.
- Some sheet metal workers specialize in testing, balancing, adjusting, and servicing existing air-conditioning and ventilation systems to make sure they are functioning properly and efficiently.

### Working Conditions

- Sheet metal workers usually work a 40-hour week.
- Fabrication shops are usually well-lit and well-ventilated. Installers do considerable work outdoors in various weather conditions.
- Significant time is spent bending, lifting, standing, climbing, and squatting, sometimes in close quarters or in awkward positions.
- Safety procedures must be followed to avoid cuts, burns, and falls. Most workers wear safety glasses. Jewelry and loose-fitting clothes cannot be worn.

### Employment

- Sheet metal workers held about 198,100 jobs in 2004 in the United States and approximately 6,920 jobs in Pennsylvania.
- Almost 50 percent worked for plumbing, heating and air-conditioning contractors. Others worked for metal manufacturing companies.

### Job Outlook

- Employment of sheet metal workers in Pennsylvania is expected to grow from approximately 6,920 in 2004 to approximately 7,480 in 2014. Sheet metal workers can expect about 56 openings due to growth and about 166 replacement openings for approximately 222 total annual openings.
- Job prospects are expected to be favorable because the number of skilled workers is likely to be insufficient to meet demand. Opportunities will be best for individuals with formal apprenticeship training.
- Growing demand for additional energy-efficient systems in old buildings, as well as other types of renovation and maintenance work, should boost employment.
- When the level of construction activity falls, sheet metal workers can experience periods of unemployment. However, maintenance work remains relatively stable.

### Earnings

Average hourly earnings of sheet metal workers in Pennsylvania were \$21.02 in 2005. The entry-level rate in 2005 was \$13.58 while an experienced sheet metal worker made \$24.74.

### Training, Other Qualifications and Advancement

Most employers recommend apprenticeship programs as the best way to learn this trade. However, some sheet metal workers learn the trade informally through on-the-job training. On-the-job training usually takes longer than an apprenticeship program.

Apprenticeship programs, which are often sponsored by joint training committees, typically last four to five years. They combine on-the-job training with classroom instruction in the use of computerized equipment, drafting,

trigonometry, geometry, welding, and the principles of heating, air-conditioning, and ventilating systems. Safety is stressed throughout the program.

On-the-job helpers learn the basics of pattern layout and how to cut, bend, and install sheet metal. This practical experience is often supplemented with vocational school courses in mathematics or sheet metal fabrication. To be promoted, helpers must pass the same written examination as apprentices.

When hiring helpers and apprentices, employers prefer high school graduates who are in good physical condition. Previous courses in algebra, trigonometry, geometry, mechanical drawing, and shop may have an advantage. Special training offered in the Armed Forces is also beneficial. Aspiring sheet metal workers should have mechanical and mathematical aptitude. Good eye-hand coordination, spatial perception, and manual dexterity are also important traits.

It is important for experienced workers to improve their existing skills or acquire new ones. In order to keep abreast of new technological developments, sheet metal workers often attend training sessions provided by the union or their employer. This training can help experienced workers advance to supervisor positions. Others may become self-employed contractors.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of sheet metal workers include assemblers and fabricators; machinists; machine setters, operators, and tenders; tool and die makers; glaziers; and heating, air-conditioning, and refrigeration mechanics and installers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Sheet Metal and Air Conditioning Contractors National Association, 4201 Lafayette Center Dr., Chantilly, VA 20151-1209. Internet: <http://www.smacna.org>
- Sheet Metal Workers International Association, 1750 New York Ave. NW, Washington, DC 20006. Internet: <http://www.smwia.org>

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## Structural & Reinforcing Iron & Metal Workers

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SOC CODES: 47-2171 and 47-2221

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### Significant Points

- Job openings are usually more abundant during the spring and summer months.
- Structural and reinforcing metal work is highly sensitive to changes in economic conditions.
- Most employers recommend a formal apprenticeship program for learning this trade.

### Nature of the Work

- Structural and reinforcing iron and metal workers fabricate, assemble, and install iron and metal products used in buildings, bridges, highways, lampposts, and other structures. They also repair, renovate, and maintain older buildings and structures.
- The structural metal, reinforcing rods, and ornamental iron arrive at the construction site in ready-to-use sections, which are lifted into position by a mobile crane. Metal workers then connect the sections together.

*Structural metal workers* connect steel columns, beams, and girders according to blueprints and instructions from supervisors. They temporarily bolt the piece in place and check the alignment. The piece is then bolted or welded in place permanently.

*Reinforcing metal workers* set the bars into the forms that hold concrete. They follow blueprints that show the location, size, and number of reinforcing bars.

- Ornamental ironwork and related pieces are installed after the exterior of the building has been completed.

### Working Conditions

- Structural and reinforcing iron and metal workers usually work outside in all kinds of weather. Those who work at great heights do not work when it is wet, icy, or extremely windy.
- Safety devices, such as safety belts, nets, and scaffolding, are used to reduce the risk of injury due to falls.

### Employment

- Structural and reinforcing iron and metal workers held about 106,100 jobs in 2004 in the United States and approximately 3,710 jobs in Pennsylvania.
- Over 53 percent worked for structural steel erection contractors. Twenty percent worked for general residential and nonresidential building contractors. Others were employed with fabricated metal products manufacturers.

### Job Outlook

- Employment of structural and reinforcing iron and metal workers in Pennsylvania is expected to grow from approximately 3,710 in 2004 to approximately 4,030 in 2014. These workers can expect about 32 openings due to growth and about 72 replacement openings for approximately 104 total annual openings.
- Employment growth will be spurred by the increased need for rehabilitation and maintenance of older buildings. In addition, more metal workers will be needed to build incinerators and other structures to contain hazardous materials as part of ongoing toxic waste cleanup. Job openings are usually more abundant during the spring and summer months, when the level of construction activity increases.
- Employment in the construction industry is sensitive to changes in the economy. When the level of activity falls, structural and reinforcing metal workers may experience high rates of unemployment.

### Earnings

- Average hourly earnings of reinforcing iron and rebar workers in Pennsylvania were \$24.90 in 2005. The entry-level rate in 2005 was \$16.01 while an experienced reinforcing iron and rebar worker made \$29.34.
- Average hourly earnings of structural iron and steel workers in Pennsylvania were \$24.04 in 2005. The entry-level rate in 2005 was \$15.20 while an experienced structural iron and steel worker made \$28.46.

### Training, Other Qualifications and Advancement

Most employers recommend apprenticeship programs as the best way to learn this trade. However, some structural and reinforcing iron and metal workers learn the trade informally through on-the-job training. On-the-job training usually takes longer than an apprenticeship program.

Apprenticeship programs, which are often sponsored by joint training committees, typically last three to four years. These programs combine on-the-job training with classroom instruction in blueprint reading, mathematics, structural erecting, rigging, reinforcing, welding, and burning as well as ornamental erection and assembling. Apprentices also study the care and safe use of tools and materials.

On-the-job trainees assist experienced workers by carrying materials. With experience, they perform more difficult tasks like cutting and fitting different parts. Although some large contractors offer extensive training programs, most companies do not offer any formal classroom training.

When hiring helpers and apprentices, employers prefer high school graduates who are at least 18 years old and in good physical condition. They also need good agility, balance, eyesight, and depth perception to safely work at great heights on narrow beams and girders. Structural and reinforcing iron and metal workers should not be afraid of heights or suffer from dizziness. Those with previous course work in mechanical drawing, shop, and general mathematics may have an advantage.

Some experienced structural and reinforcing iron and metal workers advance into supervisor positions. Others become self-employed contractors.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of structural and reinforcing iron and metal workers include cement masons and concrete finishers, operating engineers, and welders.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Associated General Contractors of America, 333 John Carlyle St., Alexandria, VA 22314.  
Internet: <http://www.agc.org>

**TRANSPORTATION**  
**AND**  
**DISTRIBUTION**

## Transportation and Distribution Introduction

This section of the *Handbook* explores careers in several different areas of transportation and distribution, including air, rail, over-the-road, and water transportation. Each of these modes of transportation requires different sets of skills/qualifications and the employment outlook varies for each.

Air transportation offers a wide range of career opportunities. The skills and experience needed in this industry differ by occupation. For example, pilots require extensive specialized training, while entry-level ground occupations require little or no previous training. Earnings for occupations in the air transportation industry are generally higher than in other industries. Senior airline pilots, in particular, are very well compensated. Employment opportunities are mostly concentrated in cities with airport facilities.

Railroad transportation is undergoing many changes to remain competitive with other modes of transportation. These include more fuel-efficient trains and computerized classification yards. The result of these technological changes has been a steady decline in railroad employment. Consolidation of railroads and job duties will make employment prospects unfavorable, with the exception of locomotive engineers.

The trucking industry is transporting a growing proportion of the nation's freight. As a result, the best prospects for employment in transportation are in over-the-road trucking. Due to its geographic location, Pennsylvania serves as an important transportation link to and from the Northeast and should see employment growth in this field. Approximately 148,000 Pennsylvanians were employed as truck drivers in 2004.

Water transportation occupations account for a small percentage of overall transportation employment, and declines expected in the coming years. Most of Pennsylvania's employment in this industry is found in the Philadelphia and Pittsburgh regions.

## Transportation & Distribution Occupations

The occupations in green are either new to this edition or have had a name change since the last.

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Air Traffic Controllers

Inspectors & Compliance Officers

Aircraft Pilots & Flight Engineers

Inspectors, Testers, Sorters, Samplers & Weighers

Blue-Collar Worker Supervisors

Material Moving Equipment Operators

Bus Driver

Rail Transportation Occupations

Dispatchers

Taxi Drivers & Chauffeurs


Flight Attendants

Truck Drivers

Handlers, Equipment Cleaners, Helpers & Laborers

Water Transportation Occupations

You will need the Adobe Acrobat Reader to successfully view/print some information. This software is provided free of charge and you may download the latest version by clicking on the 'Get Acrobat Reader' button.



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Contact the Center for Workforce Information & Analysis for alternate formats at [workforceinfo@state.pa.us](mailto:workforceinfo@state.pa.us), (717) 787-6466 or toll-free at 1-877-493-3282.



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## Air Traffic Controllers

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SOC CODE: 53-2021

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### Significant Points

- Over 95 percent were employed with the Federal government.
- Keen competition is expected for jobs.

### Nature of the Work

- Air traffic controllers coordinate the movement of air traffic to make certain that planes stay a safe distance apart and to minimize delays.

*Airport tower or terminal controllers* organize the flow of aircraft in and out of the airport. Using radar and visual observation, they guide pilots from the hangar to the end of the airport's airspace. They may also keep pilots informed about changes in weather conditions.

*Enroute controllers* regulate air traffic between airports. Nationwide control centers are assigned a certain airspace containing many different airplane routes. Working in teams of three, these controllers monitor a section of the center's airspace. The senior team member, or *radar controller*, warns pilots about nearby planes, bad weather conditions, and other potential hazards.

*Flight service specialists* provide pilots with information that is important to the safety of a flight. They assist in emergency situations and coordinate searches for missing or overdue aircraft. However, they are not actively involved in managing air traffic.

- Currently, the Federal Aviation Administration (FAA) is in the midst of developing and implementing a new automated air traffic control system. As a result, more powerful computers will help air traffic controllers deal with the demands of increased air traffic.

### Working Conditions

- Air traffic controllers usually work a 40-hour week. Because aircraft must be continuously monitored, night and weekend shifts are required.
- Total concentration is required to keep track of several different activities at the same time. During busy times, controllers must work rapidly and efficiently.
- The mental stress of being responsible for the safety of several aircraft and their passengers can be exhausting.

### Employment

- Air traffic controllers held about 24,400 jobs in 2004 in the United States and approximately 460 jobs in Pennsylvania.
- Over 95 percent were employed with the Federal government. They worked in airport towers, flight stations, and as enroute traffic control centers.

### Job Outlook

- Employment of air traffic controllers in Pennsylvania is expected to increase from 460 to 480 from 2004 to 2014. Air traffic controllers can expect about two openings due to growth and about 12 replacement openings for approximately 14 total annual openings.
- The implementation of a computerized control system will assist air traffic controllers by automatically making many of the routine decisions. This will increase worker productivity but inhibit employment growth.
- Keen competition is expected for jobs because this occupation attracts many more qualified applicants than there are openings.
- Turnover is very low because air traffic controllers have a very strong attachment to the occupation. In addition, earnings are generally high and retirement benefits are liberal.

### Earnings

- Average annual earnings of air traffic controllers in Pennsylvania were \$98,610 in 2005. The entry-level wage for an air traffic controller in 2005 was \$72,280 while an experienced air traffic controller made \$111,780.
- Retirement benefits are more liberal for air traffic controllers than other Federal employees. Controllers who are 50 years old and have 20 years of service as an active air traffic controller are eligible to retire. Likewise, those with 25 years of active service can retire at any age. There is a mandatory retirement age of 56 for all controllers who manage air traffic.

### **Training, Other Qualifications and Advancement**

Air traffic controller trainees are selected through a competitive Federal Civil Service system. Applicants must have three years of general work experience, four years of college, or a combination of both. Only people under the age of 30 can apply for airport tower and enroute center positions. Those over 30 years old are still eligible for positions at flight service stations. Qualified bidders are then given a written examination that measures their ability to learn the duties associated with air traffic control. Applicants that pass the written examination, as well as drug-screening tests, must then undergo a week of screening at the FAA academy.

Trainees undergo a combination of classroom and on-the-job training. Those who successfully complete the program and pass another series of examinations are offered a job. It takes several years of work experience, coupled with a considerable amount of additional classroom instruction and independent study, to become fully qualified. To maintain their position, air traffic controllers must pass a physical examination each year. In addition, their job performance is reviewed bi-annually.

Aspiring air traffic controllers must be decisive and articulate. Workers must be able to concentrate and make decisions in the midst of noise and other distractions. A good memory and intelligence are needed to receive, process, and remember the information they are given.

Entry-level controllers working at airports are responsible for supplying pilots with basic flight data and airport information. With experience, they advance through ground controller, local controller, departure controller, and finally, arrival controller positions. At enroute traffic control centers, new air traffic controllers deliver printed flight plans to teams. Gradually, they advance to radar associate controller and then radar controller.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of air traffic controllers include airfield operations specialists.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- National Air Traffic Controllers Association (NATCA), 1325 Massachusetts Avenue Northwest, Washington, D.C., 20005. Internet: <http://www.natca.org>.

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## Aircraft Pilots & Flight Engineers

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SOC CODES: 53-2011 and 53-2012

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### Significant Points

- Those paid to transport passengers or cargo must be licensed.
- Computerized flight management systems will eliminate the need for flight engineers on new aircraft.
- Wages are among the highest in the country.

### Nature of the Work

- *Aircraft pilots and flight engineers* fly airplanes and helicopters to transport passengers and cargo. Some dust crops, track criminals, or monitor traffic.
- Except on small aircraft, two pilots usually make up the cockpit crew. The pilot and co-pilot share all duties but the most experienced pilot, or *captain*, is in command.
- On larger aircrafts, a third pilot monitors instruments, operates equipment, and makes in-flight repairs. This pilot is known as a *flight engineer*. New technology can perform many of these tasks, so virtually all of the newer aircraft fly with only two pilots.
- Before departure, pilots choose a route, altitude, and speed that will provide the fastest, safest, and smoothest flight. They also check their aircraft to make sure that all systems are functioning properly.
- Takeoff and landing are the most difficult parts of the flight. These times require close coordination between the pilot and co-pilot, otherwise known as the *first officer*. The actual flight is relatively easy, unless the weather is bad. Airline pilots use autopilot and flight management computers to steer their planes along a pre-determined route, which is monitored by air traffic control stations. On the other hand, helicopter pilots fly at relatively low altitudes and must lookout for dangerous obstacles.

### Working Conditions

- By law, airline pilots cannot fly more than 100 hours a month or 1,000 hours a year. In reality, most pilots fly an average of 75 hours a month and spend an additional 75 hours a month performing non-flying duties.
- Because airline flights occur 24-hours a day, pilot work schedules are often irregular. Flight assignments are usually based on seniority. A considerable amount of time is spent away from home.
- Flight instructors may have irregular work schedules depending on their students' available time and the weather. They frequently work nights and weekends.
- Fatigue is common in pilots who spend many hours flying through different time zones. Those involved in police work may be subject to personal injury. Crop duster pilots may be exposed to toxic chemicals.
- Aircraft pilots and flight engineers must be alert and quick to react if something goes wrong. The mental stress of being responsible for a safe flight can be tiring.

### Employment

- Aircraft pilots and flight engineers held about 105,700 jobs in 2004 in the United States and approximately 3,220 jobs in Pennsylvania.
- About 67 percent were employed with airline companies. Another nine percent flew small planes for companies that provide non-scheduled air transportation, such as sightseeing trips, helicopter rides, medical services, and crop dusting.

### Job Outlook

- Employment of aircraft pilots and flight engineers in Pennsylvania is expected to grow from approximately 3,220 in 2004 to approximately 3,720 in 2014. These workers can expect about 49 openings due to growth and about 86 replacement openings for approximately 135 total annual openings
- Aircraft pilots and flight instructors should experience employment growth as the demand for their services increases. However, computerized flight management systems will eliminate the need for flight engineers on new aircraft.
- Job turnover in this occupation is generally low. Aircraft pilots have a substantial investment in specialized training that is not transferable to other fields. Plus, the earnings are generally high.
- Opportunities will be best in the regional commuter airlines and international service segments of the industry. Pilots who have logged the greatest number of flying hours, in the most sophisticated equipment, typically have the best prospects. Those with the most FAA licenses will also have a competitive advantage.

### **Earnings**

- Earnings of airline pilots are among the highest in the country. Although no Pennsylvania-specific wages are available, the national average annual earnings of airline pilots were \$135,040 in 2005.
- Average annual earnings of commercial pilots in Pennsylvania were \$67,530 in 2005. The entry-level wage for a commercial pilot in 2005 was \$40,050 while an experienced commercial pilot made \$81,270.
- Airline pilots receive an expense allowance, or “per diem,” for every hour they are away from home. They also receive life insurance, health insurance, and retirement benefits. If they fail the FAA physical examination at any point during their career, pilots may be issued disability payments.

### **Training, Other Qualifications and Advancement**

Pilots who are paid to transport passengers or cargo must have a commercial pilot’s license with an instrument rating. To qualify for a commercial pilot’s license, applicants must be at least 18 years old and have a minimum of 250 hours of flight experience. The experience requirement can be reduced if the applicant attends an FAA-approved flight school. In addition, applicants undergo a strict physical examination to make sure that they are in good health. All pilots must have 20/20 vision (with or without glasses), good hearing, and no physical handicaps that could impair their performance.

Aspiring airline pilots must fulfill additional requirements. Applicants for an airline transport pilot’s license must be at least 23 years old and have a minimum of 1,500 hours of experience, including night and instrument flying. These pilots usually have one or more advanced ratings. Many companies reject applicants who do not pass required psychological and aptitude tests.

All applicants must pass a written examination and demonstrate their flying ability to designated examiners. Licenses are valid as long the pilot can pass the periodic physical examinations and practical tests that are required by the Federal government.

The Armed Forces has always been an important source of trained pilots. Military pilots, who gain valuable experience on jet aircraft and helicopters, are often preferred for civilian jobs. However, those without armed forces training can attend FAA-certified flight schools. Aspiring pilots may also take flying lessons from individual FAA-certified flight instructors.

Depending on the type of aircraft, new pilots start as first officers or flight engineers. Although applicants with a flight engineer license are preferred, many airlines will provide appropriate training for those who have a commercial license. Initial training includes up to six weeks of ground school and simulator training. In addition, at least 25 hours of operating experience are required. This includes a check-ride with an FAA aviation safety inspector. Once trained and “on the line,” airline pilots are required to attend recurrent training and simulator checks twice a year throughout their career.

Organizations other than airlines usually require less flying experience. However, employers do prefer to hire applicants who have previous experience operating the type of craft they will be flying. College graduates may have an advantage. In fact, an engineering degree is often required to become a test pilot.

Experienced pilots can advance to higher paying jobs with bigger airlines. Within the industry, opportunities for advancement often depend on the seniority provisions of the union contract. After one to five years, flight engineers advance to first officer positions. Likewise, after five to 15 years, pilots are usually promoted to captain. Seniority also determines which pilots get the more desirable routes.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of aircraft pilots and flight engineers include air traffic controllers and airfield operation specialists.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Coalition of Airline Pilots Association (CAPA), 1101 Pennsylvania Ave. NW, Suite 6646, Washington, DC 20004. Internet: <http://www.capapilots.org>
- Air Transport Association (ATA), 1301 Pennsylvania Ave. NW, Suite 1100, Washington, DC 20004-1707. Internet: <http://www.airlines.org>
- Helicopter Association International, 1635 Prince St., Alexandria, VA 22314. Internet: <http://www.rotor.com>

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## Blue-Collar Worker Supervisors

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SOC CODES: 47-1011, 49-1011, 51-1011, 53-1011, 53-1021 and 53-1031

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### Significant Points

- Employers prefer to promote applicants with postsecondary technical degrees.
- Organizational restructuring and technological developments will moderate employment growth.
- Over one-third worked for manufacturing companies.

### Nature of the Work

- *Blue-collar worker supervisors* oversee the work of construction, maintenance, production, and transportation workers. Although duties are varied, a supervisor's primary task is to ensure that workers, materials, and equipment are used properly to maximize productivity.
- Computers are used to schedule procedures, monitor worker output, track materials, update inventory, and perform other supervisory tasks.
- Supervisors inform workers about company policies, provide employee reviews and recommend disciplinary action. They also meet regularly with management to report any problems and discuss possible solutions.

### Working Conditions

- Blue-collar worker supervisors usually start the day early and stay late. They may work any shift, as well as weekends and holidays.
- Work environments vary with industry. Many work on a shop floor, where they spend most of the day on their feet. Others work outdoors even in severe weather conditions.
- Organizational restructuring and downsizing have increased supervisor responsibilities. Therefore, on-the-job stress has also increased.

### Employment

- Blue-collar worker supervisors held about 2.4 million jobs in 2004 in the United States and approximately 86,060 jobs in Pennsylvania.
- Although found in almost all industries, the majority of blue-collar worker supervisors were found in manufacturing establishments. Others were employed in construction and transportation.
- The following table includes the industry groups that employed the most blue-collar worker supervisors in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Manufacturing	29,140	33.9%
Construction	13,810	16.1%
Wholesale & Retail Trade	10,420	12.1%
Transportation	6,750	7.8%
Government	5,520	6.4%
Self-Employed	4,730	5.5%

### Job Outlook

- Employment of blue-collar worker supervisors in Pennsylvania is expected to decrease from approximately 86,060 in 2004 to approximately 89,050 in 2014. Blue-collar worker supervisors can expect about 335 openings due to growth and about 1,829 replacement openings for approximately 2,164 total annual openings.
- Projected job growth varies by industry. For the most part, as the number of blue-collar workers increases, so will the need for supervisors. However, organizational restructuring and technological developments will help moderate employment growth.
- Because of their skill and seniority, blue-collar worker supervisors are usually protected from layoffs during periods of economic decline.

### Earnings

- In Pennsylvania, blue-collar worker supervisors averaged \$34,900 to \$57,400 annually in 2005. Entry-level wages were between \$21,900 and \$36,200, while experienced blue-collar worker supervisors earned anywhere from \$41,400 to \$68,000.
- The following table includes the average annual, entry level, and experienced level wages in 2005 for different blue-collar worker supervisors in Pennsylvania.

Occupational Title	Average Annual Wage	Entry Level Wage	Experienced Level Wage
Supervisors - Construction Trades & Extraction Workers	\$57,370	\$36,120	\$68,000
Supervisors - Mechanics, Installers & Repairers	\$54,890	\$35,730	\$64,460
Supervisors - Production & Operating Workers	\$51,020	\$33,370	\$59,840
Aircraft Cargo Handling Supervisors	\$34,970	\$21,980	\$41,460
Supervisors - Helpers, Laborers & Material Movers, Hand	\$45,040	\$28,620	\$53,260
Supervisors - Trans. & Material-Moving Machine/Vehicle Oprs	\$51,540	\$32,420	\$61,110

### Training, Other Qualifications and Advancement

When choosing a supervisor, employers look for well-rounded workers who are knowledgeable and organized. Those who are able to motivate employees, maintain morale and command respect have the best advancement opportunities. Strong communication and interpersonal skills are extremely important attributes.

Although the minimum educational requirement is a high school diploma, many organizations prefer to promote applicants with post-secondary technical degrees. In fact, supervisors in highly technological industries may need a bachelor's degree. Regardless of their previous education, workers receive additional training in human resources, computer software, and management before advancing into a supervisory position.

Training requirements for advanced opportunities beyond a supervisory level differ by industry. Supervisors in manufacturing companies usually need a business or engineering degree and in-house training to advance to department head or production manager. In the construction industry, a degree in construction management or engineering is often needed to become a project manager, operations manager, or general superintendent. Some blue-collar worker supervisors eventually open their own businesses.

### Related Occupations

Workers in other occupations with responsibilities and duties related to those of blue-collar supervisors include those who supervise professional, technical, sales, clerical, and service workers.

### Sources of Additional Information

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- American Management Association, 1601 Broadway, New York, NY 10019. Internet: <http://www.amanet.org>
- National Management Association, 2210 Arbor Blvd., Dayton, OH 45439. Internet: <http://www.nma1.org>
- American Institute of Constructors, 466 94th Ave. N., St. Petersburg, FL 33702. Internet: <http://www.aicnet.org>

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## Bus Drivers

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SOC CODES: 53-3021 and 53-3022

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### Significant Points

- Job opportunities should be favorable, especially for school bus drivers.
- Employers provide on-the-job training that combines classroom instruction with “behind-the-wheel” training.
- A commercial driver’s license is needed for interstate bus routes.

### Nature of the Work

- Bus drivers are responsible for safely transporting passengers from one place to another. They pickup and drop off passengers at bus stops and stations. In addition, they collect fares, announce stops, and answer trip-related questions.

***Intercity bus drivers*** transport passengers between two cities. The trip may be one-way or round trip.

***Local transit bus drivers*** make several daily trips over the same city and suburban streets. Bus stops may occur every few blocks.

***Motorcoach drivers*** transport passengers on charter trips and sightseeing tours. These trips may last several days.

***School bus drivers*** follow a set route to pickup students and return them to their homes. They may also transport students and teachers to sporting events or on field trips.

- To prevent accidents and sudden stops, bus drivers must be alert. They must maintain order and enforce rules regarding passenger conduct.

### Working Conditions

- All bus drivers must adhere to the Department of Transportation’s rules and regulations regarding hours of service. Bus drivers may not work more than 60 hours in any seven-day period and they must rest eight hours for every 10 hours of driving.

Intercity bus drivers must be prepared to report for work on short notice. Schedules often include evening, weekend, and holiday hours.

Local transit bus drivers usually work five days per week. Shifts may include evenings and weekends.

Motorcoach drivers may work any hour of any day, including weekends and holidays.

School bus drivers usually work less than 20 hours per week. They only work when school is in session.

- Intercity and motorcoach bus travel tends to be seasonal. Work schedules may be very hectic from May to August but limited during the winter
- Although driving a bus is not physically strenuous, it can be stressful and fatiguing.

### Employment

- Bus drivers held 653,200 jobs in 2004 in the United States and approximately 38,230 jobs in Pennsylvania.
- About 45 percent worked for companies that provide contracted bus service to schools. Others were employed with educational institutions, government agencies, and private transit systems.
- The following table includes the industries that employed the most bus drivers in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
School & Employee Bus Transportation	17,270	45.2%
Local Government	6,370	16.7%
Elementary & Secondary Schools	5,240	13.7%
State Government	2,210	5.8%

### Job Outlook

- Employment of bus drivers in Pennsylvania is expected to grow from approximately 38,230 in 2004 to approximately 42,940 in 2014. Bus drivers can expect about 471 openings due to growth and about 832 replacement openings for approximately 1,303 total annual openings.

- A growing population and labor force will increase the demand for bus travel. Group charter travel will see the largest growth. However, competition for these well-paying jobs will be keen.
- Increasing gas prices will lead to higher demand for public transit, increasing demand for more bus drivers.
- School bus driver positions should be easier to acquire since they are usually part-time with minimal training requirements. Demand will be stimulated by the growth in school enrollment.
- Opportunities will be best for individuals with good driving records who are willing to work irregular schedules. School bus drivers will have the best prospects in rapidly growing metropolitan areas.

#### **Earnings**

- Average annual earnings of bus drivers in Pennsylvania were \$32,800 in 2005. The entry-level wage for a bus driver in 2005 was \$20,230 while an experienced bus driver made \$39,090.
- Average annual earnings of school bus drivers in Pennsylvania were \$22,120 in 2005. The entry-level wage for a school bus driver in 2005 was \$13,610 while an experienced school bus driver made \$26,370.

#### **Training, Other Qualifications and Advancement**

When hiring new bus drivers, employers look for high school graduates who are even-tempered and emotionally stable. Most organizations also test the applicant's ability to follow complex bus schedules. Strong customer service, communication, and organizational skills are required. Many bus companies prefer to hire those who are at least 24 years old and have previous bus or truck driving experience.

Bus driver qualifications and standards are established by State and Federal regulations. All drivers engaged in interstate activities must be at least 21 years old, have a clean criminal record, and pass a biannual physical examination. Aspiring bus drivers must have good hearing, 20/40 corrected vision, and normal blood pressure. Those with color blindness, epilepsy, or diabetes controlled by insulin are not permitted to be interstate drivers. Drivers cannot be taking any controlled substances, unless prescribed by a licensed physician. Federal regulations also require employers to issue periodic tests for drug and alcohol use.

Before they are allowed to operate any buses, drivers must pass a written examination about Federal regulations in order to obtain a commercial driver's license (CDL). Applicants must also demonstrate their ability to safely operate a bus. Additional information about applying for a CDL is available through the Pennsylvania Department of Transportation.

Most employers provide some on-the-job training that combines classroom instruction with "behind-the-wheel" training. For school bus drivers, training programs last about one to four weeks. They learn about regulations, safe driving practices, first aid, handling students, and emergency evacuation procedures. Programs for intercity and local transit bus drivers last about two to eight weeks. Classroom topics include company rules, safety regulations, and driving practices. New drivers also learn how to read bus schedules, determine fares, and deal with customers. Once trained, intercity and local transit bus drivers are placed on an "extra," or stand-by, list to drive special routes and runs. They often substitute for regular drivers who are ill or on vacation. Drivers may remain on this list for several years or until they have enough seniority to receive a regular run.

Advancement opportunities for bus drivers are limited. In public systems, promotion is based solely on competitive examination. Other experienced workers may become dispatchers, supervisors, or managers. In transit agencies with rail systems, bus drivers may take positions as train operators or station attendants. A few purchase their own equipment and go into business for themselves.

#### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of bus drivers include ambulance drivers and attendants; taxi drivers and chauffeurs; and truck drivers and driver/ sales workers.

#### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- American Bus Association, 700 13<sup>th</sup> St. NW, Suite 575, Washington, DC 20005. Internet: <http://www.buses.org>
- National School Transportation Association, 625 Slaters Lane, Suite 205, Alexandria, VA 22314. Internet: <http://www.schooltrans.com>
- American Public Transportation Association, 1666 K St. NW, Suite 110, Washington, DC 20006. Internet: <http://www.apta.com>
- United Motorcoach Association, 113 S. West St., 4<sup>th</sup> Fl., Alexandria, VA 22314. Internet: <http://www.uma.org>



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## Dispatchers

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SOC CODES: 43-5031 and 43-5032

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### Significant Points

- A high school diploma is required for this entry-level position.
- Job opportunities will be best for individuals with computer skills and previous experience.
- Voluntary certification is available for public safety dispatchers.

### Nature of the Work

- Dispatchers receive service requests and initiate the necessary actions to provide that service. They usually prepare detailed reports on all activities that occur during their shift.
- Regardless of where they work, all dispatchers are assigned to a specific territory. Within larger companies, many dispatchers work in teams.

*Police, fire, and ambulance dispatchers*, also called public safety dispatchers, monitor the location of emergency services personnel. They may provide first aid instructions while the caller is waiting for help.

*Truck dispatchers* coordinate the movement of trucks and freight between cities.

*Bus dispatchers* make sure that buses stay on schedule. They may arrange for repairs to restore service.

*Train dispatchers* ensure the timely and efficient movement of trains.

*Taxicab dispatchers* respond to requests for taxicab service.

*Tow truck dispatchers* take calls for emergency road service and relay them to a nearby service station.

*Gas and water service dispatchers* monitor gas lines and water mains. They send out service crews to take care of emergencies.

### Working Conditions

- Most dispatchers work a 40-hour week. Alternative work schedules are necessary to accommodate evening, weekend, and holiday work.
- Dispatchers, who spend most of their day sitting in front of video display terminals, are susceptible to eyestrain and back discomfort.
- Because many calls come in at the same time, work can be hectic and stressful. Dispatchers must remain calm and in control of the situation.

### Employment

- Dispatchers held about 266,200 jobs in 2004 in the United States and approximately 8,780 jobs in Pennsylvania.
- About 36 percent worked for state and local government agencies. Another 14 percent were employed with local and long distance trucking companies.
- The following table includes the industries that employed the most dispatchers in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
Local Government	2,800	31.8%
General Freight Trucking	880	10.1%
State Government	400	4.6%
Specialized Freight Trucking	350	4.0%

### Job Outlook

- Employment of dispatchers in Pennsylvania is expected to grow from approximately 8,780 in 2004 to approximately 9,110 in 2014. Dispatchers can expect about 32 openings due to growth and about 189 replacement openings for approximately 221 total annual openings.
- Individuals with computer skills and previous experience will have the best opportunities for employment as public safety dispatchers.
- Employment growth for dispatchers that are not involved in public safety can be sensitive to economic conditions. Layoffs and reduced work schedules may occur during economic downturns.

### **Earnings**

- Average hourly earnings of public safety dispatchers in Pennsylvania were \$14.44 in 2005. The entry-level rate for a public safety dispatcher in 2005 was \$10.50 while an experienced public safety dispatcher made \$16.41.
- Average hourly earnings of other dispatchers in Pennsylvania were \$16.03 in 2005. The entry-level rate for dispatcher in 2005 was \$10.27 while an experienced dispatcher made \$18.90.

### **Training, Other Qualifications and Advancement**

Dispatching jobs are primarily entry-level positions that require a high school diploma and very little experience. However, some employers prefer to hire those who are familiar with computers and other electronic office equipment. Applicants who have completed a business course may have an advantage.

Newly hired dispatchers undergo extensive on-the-job training. Under the supervision of an experienced dispatcher, trainees monitor calls and learn how to operate a variety of communications equipment. As they gain confidence, new dispatchers begin to handle calls themselves.

Civil service regulations usually govern public safety dispatching jobs. Candidates for these positions may be required to pass written, oral, and performance tests. Although there is no mandatory licensing requirement, several public safety organizations offer voluntary certification programs. Dispatchers who participate in these programs greatly improve their prospects for advancement.

Strong oral and written communication skills are essential. In addition, dispatchers must be able to work well under pressure. Other clerical skills, such as typing and filing, are also important. Public safety dispatchers are often required to reside in the city or county in which they are employed. Those who work in the transportation industry must be able to adapt to shipping disruptions caused by bad weather, road construction, or accidents.

Advancement opportunities vary with the place of employment. Dispatchers who work for private firms will find few opportunities. However, public safety dispatchers can be promoted to shift or division supervisor positions. Others move on to higher paying administrative jobs. A few become police officers or firefighters.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of dispatchers include air traffic controllers, communications equipment operators, customer service representatives, and transportation agents.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- National Academies of Emergency Dispatch, 139 E. South Temple, Suite 530, Salt Lake City, UT 84111. Internet: <http://www.emergencydispatch.org>
- Association of Public Safety Communications Officials International Inc., 351 N. Williamson Blvd., Daytona Beach, FL 32114-1112. Internet: <http://www.apcointl.org>
- Service Employees International Union, 1313 L St. NW, Washington DC 20005. Internet: <http://www.seiu.org>
- International Municipal Signal Association, 165 E. Union St., Newark, NY 14513. Internet: <http://www.imsasafety.org>

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## Flight Attendants

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SOC CODE: 39-6031

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### Significant Points

- Trainees undergo intensive formal training after they are selected.
- Newly hired workers may spend several years on “reserve status.”
- Opportunities to travel and see new places are great.

### Nature of the Work

- The primary function of *flight attendants* is to ensure that safety regulations are followed at all times. They try to make the flight comfortable and enjoyable.
- Before each flight, the pilot briefs the crew on such things as emergency evacuation procedures, expected weather conditions, and special passenger problems. Before passengers board, flight attendants make sure that first aid kits and other emergency equipment are aboard and in working order.
- Flight attendants greet passengers as they board the plane. They check tickets and instruct passengers on where to store carry-on items. After everyone has boarded, flight attendants provide instructions on the use of emergency equipment and check to see that seat belts are fastened.
- Lead attendants, sometimes known as first flight attendants or pursers, oversee the work of the other attendants aboard the aircraft. They also perform many of the same duties.

### Working Conditions

- Flight attendants are in the air about 75 to 85 hours a month. Equal time is spent on the ground preparing for flights, writing follow-up reports, and waiting for planes to arrive.
- Because airline flights occur 24-hours a day, work schedules are often irregular. Flight attendants may be required to work nights, weekends, or holidays. A great deal of time is spent away from home. During this period, the airline provides hotel accommodations and meal allowances.
- Many flight attendants have 11 or more days off per month. The combination of free time and discount airfares provides them the opportunity to travel and see new places.
- This work can be very strenuous and trying. Regardless of how tired they get, flight attendants must remain pleasant and efficient.
- Injuries and other medical problems are common amongst flight attendants. Problems can occur from irregular sleeping patterns, poor nutritional habits, working in a pressurized environment, and breathing recycled air.

### Employment

- Flight attendants held about 102,500 jobs in 2004 in the United States and approximately 4,300 jobs in Pennsylvania.
- Almost all flight attendants were employed in the air transportation industry.

### Job Outlook

- Employment of flight attendants in Pennsylvania is expected to grow from approximately 4,300 in 2004 to approximately 4,900 in 2014. Flight attendants can expect about 60 openings due to growth and about 55 replacement openings for approximately 115 total annual openings.
- Job opportunities should be favorable because the number of applicants is expected to be about the same as the number of job openings. Prospects should be best for those with college-level education and prior experience in dealing with the public.
- Aspiring flight attendants are attracted to this occupation by the opportunity to travel. Some leave in search of jobs that offer higher earnings and require fewer nights away from their families.

### Earnings

- No Pennsylvania-specific wage information was available for flight attendants. However, the national average annual earnings of flight attendants were \$53,740 in 2005.
- Pay scales vary by carrier. New hires usually begin at the same pay scale regardless of experience.
- Flight attendants often receive extra compensation for night and international flights. In addition, some airlines offer incentive pay for working holidays.

### **Training, Other Qualifications and Advancement**

Prospective flight attendants should be at least 18 years old and have a high school degree. Those with several years of college education or prior experience in dealing with the public are preferred. Employers look for poised, tactful people who can interact comfortably with strangers and remain calm under duress. Flight attendants should be in good health and willing to relocate, if necessary. In general, airlines also have height and weight requirements for their flight attendants. Applicants who wish to work on international flights should be fluent in two or more foreign languages.

Candidates undergo a four to seven week period of training at an airline's flight training center. Airlines may provide transportation to the training center and an allowance for room, board, and school supplies. However, trainees are not considered airline employees until they complete their training. In fact, some airlines actually charge individuals for training. These programs teach aspiring flight attendants how to handle emergency situations and administer first aid. Trainees for international routes get additional instruction in passport and customs regulations. Towards the end of their training, students go on practice flights. Experienced flight attendants must receive about 12 to 14 hours of additional training in emergency procedures and passenger relations each year.

After completing their training, new flight attendants are placed on "reserve status." For at least one year, these workers are called on to staff extra flights and fill in when needed. In some cities, it may take more than 10 years for flight attendants to advance from reserve status. Non-reserve staff bid for their monthly assignment. Because these assignments are based on seniority, only those with the most experience get their first choice.

Experienced flight attendants can become lead attendants or supervisors. Others take on additional duties, such as recruiting and instructing.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of flight attendants include emergency medical technicians, paramedics, and firefighters.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Air Transport Association (ATA), 1301 Pennsylvania Ave. NW, Suite 1100, Washington, DC 20004-1707. Internet: <http://www.airlines.org>

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## Handlers, Equipment Cleaners, Helpers & Laborers

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SOC CODES: 47-2061, 47-3011, 47-3012, 47-3013, 47-3014, 47-3015, 47-3016, 47-5081, 49-9098, 51-9198, 53-6021, 53-6031, 53-7061, 53-7062, 53-7063, 53-7064 and 53-7081

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### Significant Points

- Most jobs are entry-level and require no formal training.
- Projected employment growth varies by occupation.

### Nature of the Work

- Handlers, equipment cleaners, helpers, and laborers (called general laborers going forward) perform tasks that are needed to make the work of skilled construction, maintenance, and production workers flow smoothly.
- To perform their jobs effectively, general laborers must be familiar with the work of those they are assisting.

*Construction craft laborers* provide much of the physically demanding labor at construction sites. They may prepare sites, dig trenches, mix concrete, or set explosives.

*Freight, stock, and material movers* use forklifts, dollies, carts, and manual power to move materials between storage and production areas.

*Hand packers and packagers* manually pack, package, or wrap a variety of materials. They may inspect items, label cartons, and stack packages.

*Helpers* assist skilled workers. They may fetch tools, hold materials, or clean work areas.

*Machine feeders and offbearers* are responsible for feeding or removing materials from machines.

*Parking lot attendants* assist customers in parking their cars and collect parking fees.

*Refuse and recyclable material collectors* gather trash, garbage, and recyclables from homes and businesses along a regularly scheduled route. They also transport the refuse to the dump, landfill, or recycling center.

*Service station attendants* fill fuel tanks and wash windshields on vehicles. They may perform simple repairs under the direction of a mechanic.

*Vehicle washers and equipment cleaners* use water and various cleaning equipment to maintain machinery, vehicles, storage tanks, pipelines, and similar equipment.

### Working Conditions

- Although work schedules vary with industry, most general laborers work 8-hour shifts. Early morning, evening, and “graveyard” shifts are common.
- General laborers do repetitive, physically demanding work. They may work at great heights or in tight, awkward places. Some laborers work outdoors in all weather conditions.
- These employees wear safety clothing and hard hats to avoid against injury. Because they may be exposed to harmful materials or chemicals, some workers wear protective devices over their eyes, mouth, and ears.

### Employment

- General laborers held about 6.2 million jobs in 2004 in the United States and approximately 253,580 jobs in Pennsylvania.
- Nearly one-quarter worked for manufacturing companies. About 18 percent were employed in the construction industry and roughly 17 percent in service-providing establishments.
- The following table includes the industry groups that employed the most general laborers in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Manufacturing	60,170	23.7%
Construction	44,660	17.6%
Services	41,910	16.5%
Retail Trade	36,600	14.4%
Transportation & Warehousing	27,800	11.0%

### Job Outlook

- Employment of general laborers in Pennsylvania is expected to decrease from approximately 253,580 in 2004 to approximately 252,670 in 2014. About 7,425 annual openings will result from replacement needs. Although no net employment growth is expected for general laborers, growth openings may occur in some specific occupations and certain regions.
- Equipment cleaners, hand packers, parking lot attendants, construction helpers, and refuse material collectors will have the best employment prospects. Service station attendants and machine feeders can expect declines in employment levels.
- Employment growth will be limited by automation, out-sourcing, and job combination. All of these factors increase productivity and improve quality control. As a result, many jobs will be eliminated.

### Earnings

- In Pennsylvania, general laborers averaged \$8.30 to \$15.10 per hour in 2005. Entry-level rates were between \$6.00 and \$9.40 per hour, while experienced laborers earned anywhere from \$9.40 to \$18.00 per hour.
- The following table includes the average hourly, entry level, and experienced level wages in 2005 for general laborers in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Construction Laborers	\$15.06	\$9.36	\$17.91
Helpers--Brick, Block & Stonemasons and Tile & Marble Setters	\$13.33	\$9.11	\$15.44
Helpers--Carpenters	\$10.93	\$8.29	\$12.25
Helpers--Electricians	\$12.52	\$8.08	\$14.74
Helpers--Painters, Paperhangers, Plasterers & Stucco Masons	\$11.30	\$7.61	\$13.15
Helpers--Pipelayers, Plumbers, Pipefitters & Steamfitters	\$12.00	\$8.71	\$13.65
Helpers--Roofers	\$10.85	\$7.88	\$12.34
Helpers--Extraction Workers	\$13.02	\$8.59	\$15.23
Helpers--Installation, Maintenance & Repair Workers	\$11.29	\$7.36	\$13.26
Helpers--Production Workers	\$11.40	\$7.74	\$13.23
Parking Lot Attendants	\$8.34	\$6.19	\$9.42
Service Station Attendants	\$8.32	\$6.00	\$9.48
Cleaners of Vehicles & Equipment	\$8.92	\$6.32	\$10.22
Laborers & Freight, Stock & Material Movers, Hand	\$11.61	\$7.65	\$13.59
Machine Feeders & Offbearers	\$12.07	\$8.29	\$13.97
Packers & Packagers, Hand	\$10.10	\$6.99	\$11.65
Refuse & Recyclable Material Collectors	\$13.82	\$8.63	\$16.41

### Training, Other Qualifications and Advancement

Most general laborer positions are entry-level and do not require a high school diploma or any previous experience. However, most employers prefer to hire those who are at least 18 years old and physically able to perform the work. Applicants may have to take a physical exam, pass a drug test, or undergo a background check prior to employment.

Workers must be reliable and hard working. Basic reading and math skills are needed to understand procedure manuals and collect payments from customers. Grocery store baggers, service station workers, and parking lot attendants should be pleasant and courteous when dealing with the public.

Although most general laborers learn their skills through on-the-job training, formal apprenticeship programs are available in construction trades. These programs, which combine on-the-job training with classroom instruction, provide overall preparation. Apprentices are taught how to properly handle all tools and equipment.

Before an apprentice is placed on the job, most union contractors require some hands-on training. Likewise, workers who must handle toxic chemicals or operate dangerous equipment often receive additional training in safety awareness and procedures.

Experienced laborers often become trainees for skilled construction, maintenance, and production positions. In fact, most employers prefer to fill open slots with qualified workers from within the company. Some general laborers are promoted to supervisory positions.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of general laborers include roustabouts, forest workers, logging equipment operators, and groundskeepers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- International Carwash Association, 401 N. Michigan Ave., Chicago, IL 60611.  
Internet: <http://www.carwashes.com>

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## Inspectors & Compliance Officers

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SOC CODES: 13-1041, 13-2061, 17-2111, 19-2041, 29-9011, 29-9012, 45-2011 and 53-6051

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### Significant Points

- Because job functions are so diverse, entry-level occupational requirements vary widely.
- Most worked for government agencies.

### Nature of the Work

- Inspectors and compliance officers are responsible for keeping work environments safe, food healthy, and the environment clean. The duties performed will vary with area of responsibility and level of experience.
  - Aviation safety inspectors* work for the Federal Aviation Administration (FAA) and oversee the avionics, maintenance, and operations of air carrier establishments.
  - Bank examiners* investigate financial institutions and their compliance with Federal or State regulations that govern the institution's operation and solvency.
  - Consumer safety officers* inspect food, feeds, pesticides, biological products, cosmetics, drugs, medical equipment, and radiation emitting products.
  - Environmental health inspectors* analyze substances in order to determine contamination or the presence of disease. They ensure that the quality of food, water, and air meets government standards.
  - Equal opportunity specialists* enforce laws and regulations that prohibit discrimination in employment and the provision of services on the basis of race, color, national origin, religion, sex, disability, and age.
  - Food Inspectors* ensure that food products are fit for human consumption and in compliance with Federal laws. Processing food inspectors specialize in processed ingredients that are contained in the final product.
  - Mine safety and health inspectors* conduct on-site inspections of mines, mills, and quarries in search of conditions that are potentially hazardous to the safety and health of workers.
  - Occupational Safety and Health Administration (OSHA) inspectors* serve as expert consultants on the application of safety principles, practices, and techniques in the workplace.
  - Park rangers* enforce laws and regulations in State and national parks.
  - Securities compliance examiners* implement regulations concerning securities and real estate transactions.
- Other inspectors and compliance officers include attendance officers, logging operations inspectors, coroners, travel accommodations raters, code inspectors, mortician investigators, and dealer-compliance representatives.

### Working Conditions

- Many inspectors and compliance officers work long, irregular hours. Considerable fieldwork and frequent travel may be required. Workers are usually reimbursed for their travel expenses.
- Working environments may be unpleasant, stressful or dangerous. For example, food inspectors may work near machinery or in confined areas with livestock. Park rangers often work outdoors in rugged terrain and extreme temperature differences.
- Inspectors may find themselves in an adversarial role when the organization or individual being inspected objects to the process or its consequences.

### Employment

- Inspectors and compliance officers held about 391,500 jobs in 2004 in the United States and approximately 14,080 jobs in Pennsylvania.
- About 44 percent were employed with Federal, state and local government agencies. Another 27 percent worked for service-providing companies.
- The following table includes the industry groups that employed the most inspectors and compliance officers in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Government	6,150	43.7%
Services	3,830	27.2%
Finance & Insurance	1,640	11.6%
Manufacturing	1,160	8.2%



### Job Outlook

- Employment of inspectors and compliance officers in Pennsylvania is expected to grow from approximately 14,080 in 2004 to approximately 15,010 in 2014. Inspectors and compliance officers can expect about 93 openings due to growth and about 323 replacement openings for approximately 416 total annual openings.
- Employment growth will be relatively steady as the public demand for a safe environment and quality products offsets the desire to limit government regulations.
- General economic fluctuations seldom affect employment growth. Government agencies, which employ the most inspectors and compliance officers, provide considerable job security.

### Earnings

- In Pennsylvania, inspectors and compliance officers averaged \$43,000 to \$70,000 annually in 2005. Entry-level workers earned between \$19,000 and \$47,000, while experienced inspectors and compliance officers were paid anywhere from \$48,000 to \$84,000.
- Financial examiners earned the highest average annual and experienced level wages, while entry-level wages were greatest for health and safety engineers. Occupational health and safety technicians had the lowest average annual and entry-level wages.
- The following table includes the average annual, entry level, and experienced level wages in 2005 for inspectors and compliance officers in Pennsylvania.

Occupational Title	Average Annual Wage	Entry Level Wage	Experienced Level Wage
Compliance Officers	\$50,080	\$31,320	\$59,450
Financial Examiners	\$69,050	\$39,940	\$83,610
Health & Safety Engineers	\$64,880	\$46,250	\$74,190
Environmental Scientists & Specialists	\$59,330	\$33,540	\$72,220
Occupational Health & Safety Specialists	\$53,930	\$32,640	\$64,570
Occupational Health & Safety Technicians	\$43,310	\$19,640	\$55,140
Agricultural Inspectors	\$44,100	\$34,330	\$48,990
Transportation Inspectors	\$52,030	\$22,330	\$66,880

### Training, Other Qualifications and Advancement

Because job functions are so diverse, the occupational requirements for inspector and compliance officer positions vary widely. However, some combination of education, experience, and passing examination scores is usually required. Many employers prefer a college degree and previous experience in the area being investigated.

Position-specific laws and procedures are usually taught through on-the-job training and classroom instruction. In addition, certain positions require special licenses and certifications. For example, aviation safety inspectors must possess a valid pilot's license.

Aspiring inspectors and compliance officers should be responsible people who like detailed work. Strong communication skills are very important. For certain positions, applicants may have to meet strict medical requirements and be able to perform arduous duties efficiently.

Inspectors and compliance officers with satisfactory job performance often advance through a career ladder to a specified full-performance level. For positions above this level, advancement becomes competitive. Appointments are made based on agency needs and the individual's merit.

### Related Occupations

Workers in other occupations with responsibilities and duties related to those of inspectors and compliance officers include construction inspectors, building inspectors, fish and game wardens, fire marshals, law enforcement professionals, and correctional officers.

### Sources of Additional Information

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>

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## Inspectors, Testers, Sorters, Samplers & Weighers

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SOC CODES: 51-9061

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### Significant Points

- Automation will dampen employment growth in certain industries.
- Training requirements vary with job responsibilities.

### Nature of the Work

- *Inspectors, testers, sorters, samplers, and weighers* use a number of tools to monitor quality standards for manufactured products. They may use sight, sound, feel, smell, or taste to check products.
- Quality checks are involved at every stage of the production process. *Quality control inspectors*, as they are otherwise known, may examine raw materials, subassemblies, or finished products.
- After problems have been identified, quality control inspectors may reject defective items, send them for repair, or fix minor problems themselves. They record results, compute defect percentages, and prepare reports.

### Working Conditions

- Quality control inspectors may work daylight, evening, or weekend shifts. Work schedules are typically assigned based on seniority. Overtime may be required to meet production goals.
- Shifts may be spent examining similar products or a variety of items.
- Work environments range from clean, air-conditioned rooms to noisy, grimy manufacturing plants.
- Some quality control inspectors spend all day on their feet and are expected to lift heavy objects. Others sit through their shifts and do little strenuous work.

### Employment

- Quality control inspectors held about 507,600 jobs in 2004 in the United States and approximately 22,710 jobs in Pennsylvania.
- Almost 71 percent were employed with manufacturing establishments. Others worked for service-providing firms, wholesalers and government agencies.
- The following table includes the industry groups that employed the most quality control inspectors in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Manufacturing	16,110	70.9%
Services	3,440	15.1%
Wholesale & Retail Trade	1,090	4.8%
Government	1,050	4.6%

### Job Outlook

- Employment of quality control inspectors in Pennsylvania is expected to decrease from approximately 22,710 in 2004 to approximately 20,610 in 2014. About 517 annual openings will result from replacement needs. Although no net employment growth is expected statewide, growth openings may occur in some areas.
- Automated inspection and the re-distribution of quality control responsibilities will dampen employment growth. However, automation is not being pursued in all industries.
- Employment levels are expected to increase the most in fast-growing industries, such as wholesale trade and business services.
- Job openings should be plentiful because this is a large occupation with significant turnover. Many jobs, however, will be available only to experienced production workers with advanced skills.

### Earnings

Average hourly earnings of quality control inspectors in Pennsylvania were \$15.74 in 2005. The entry-level rate for a quality control inspector in 2005 was \$9.97 while an experienced inspector made \$18.62.

### **Earnings**

- Earnings of airline pilots are among the highest in the country. Although no Pennsylvania-specific wages are available, the national average annual earnings of airline pilots were \$135,040 in 2005.
- Average annual earnings of commercial pilots in Pennsylvania were \$67,530 in 2005. The entry-level wage for a commercial pilot in 2005 was \$40,050 while an experienced commercial pilot made \$81,270.
- Airline pilots receive an expense allowance, or “per diem,” for every hour they are away from home. They also receive life insurance, health insurance, and retirement benefits. If they fail the FAA physical examination at any point during their career, pilots may be issued disability payments.

### **Training, Other Qualifications and Advancement**

Pilots who are paid to transport passengers or cargo must have a commercial pilot’s license with an instrument rating. To qualify for a commercial pilot’s license, applicants must be at least 18 years old and have a minimum of 250 hours of flight experience. The experience requirement can be reduced if the applicant attends an FAA-approved flight school. In addition, applicants undergo a strict physical examination to make sure that they are in good health. All pilots must have 20/20 vision (with or without glasses), good hearing, and no physical handicaps that could impair their performance.

Aspiring airline pilots must fulfill additional requirements. Applicants for an airline transport pilot’s license must be at least 23 years old and have a minimum of 1,500 hours of experience, including night and instrument flying. These pilots usually have one or more advanced ratings. Many companies reject applicants who do not pass required psychological and aptitude tests.

All applicants must pass a written examination and demonstrate their flying ability to designated examiners. Licenses are valid as long the pilot can pass the periodic physical examinations and practical tests that are required by the Federal government.

The Armed Forces has always been an important source of trained pilots. Military pilots, who gain valuable experience on jet aircraft and helicopters, are often preferred for civilian jobs. However, those without armed forces training can attend FAA-certified flight schools. Aspiring pilots may also take flying lessons from individual FAA-certified flight instructors.

Depending on the type of aircraft, new pilots start as first officers or flight engineers. Although applicants with a flight engineer license are preferred, many airlines will provide appropriate training for those who have a commercial license. Initial training includes up to six weeks of ground school and simulator training. In addition, at least 25 hours of operating experience are required. This includes a check-ride with an FAA aviation safety inspector. Once trained and “on the line,” airline pilots are required to attend recurrent training and simulator checks twice a year throughout their career.

Organizations other than airlines usually require less flying experience. However, employers do prefer to hire applicants who have previous experience operating the type of craft they will be flying. College graduates may have an advantage. In fact, an engineering degree is often required to become a test pilot.

Experienced pilots can advance to higher paying jobs with bigger airlines. Within the industry, opportunities for advancement often depend on the seniority provisions of the union contract. After one to five years, flight engineers advance to first officer positions. Likewise, after five to 15 years, pilots are usually promoted to captain. Seniority also determines which pilots get the more desirable routes.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of aircraft pilots and flight engineers include air traffic controllers and airfield operation specialists.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Coalition of Airline Pilots Association (CAPA), 1101 Pennsylvania Ave. NW, Suite 6646, Washington, DC 20004. Internet: <http://www.capapilots.org>
- Air Transport Association (ATA), 1301 Pennsylvania Ave. NW, Suite 1100, Washington, DC 20004-1707. Internet: <http://www.airlines.org>
- Helicopter Association International, 1635 Prince St., Alexandria, VA 22314. Internet: <http://www.rotor.com>

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## Material Moving Equipment Operators

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SOC CODES: 53-7011, 53-7021, 53-7031, 53-7032, 53-7033, 53-7041, 53-7051, 53-7071, 53-7072, 53-7073, 53-7111 and 53-7121

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### Significant Points

- Necessary skills are acquired through on-the-job training programs.
- Job growth will depend on the employing industry.

### Nature of the Work

- Material moving equipment operators use machinery to move construction materials, earth, petroleum products, and other heavy materials. They may also load or unload trucks, ships, and railroad cars.
- Unique skills are needed to operate different pieces of equipment.
  - Industrial truck and tractor operators* use machinery equipped with lifting devices to carry loads. They also pull trailers loaded with materials, goods, or equipment.
  - Excavation and loading machine operators* control machinery that is equipped with scoops, shovels, or buckets to excavate sand, gravel, and earth. They also load materials into trucks or onto conveyors.
  - Crane and tower operators* use equipment that lifts materials, machinery, and other heavy objects with a hook that is attached to a load line.
  - Hoist and winch operators* control the movement of cables, cages, and platforms to move workers and materials for industrial operations.
- Most equipment operators keep records of the materials that they have moved. They are also responsible for cleaning, fueling, and servicing their machinery.

### Working Conditions

- Material moving equipment operators usually work outdoors, through all weather conditions. However, most industrial truck and tractor operators work in warehouses or manufacturing plants.
- Machinery can be very noisy. It can also shake or jolt the operator.
- To reduce the risk of injury, proper operating procedures must be followed at all times. Workers must adhere to strict safety guidelines and use safety equipment when it is available.

### Employment

- Material moving equipment operators held about 876,900 jobs in 2004 in the United States and approximately 41,170 jobs in Pennsylvania.
- Although found in many different industries, the majority were employed with manufacturing establishments. Others worked in the transportation, wholesale trade, mining, and construction industries.
- The following table includes the industry groups that employed the most material moving equipment operators in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Manufacturing	14,400	35.0%
Transportation & Warehousing	12,600	30.6%
Trade	5,940	14.4%
Mining	2,310	5.6%

### Job Outlook

- Employment of material moving equipment operators in Pennsylvania is expected to increase from approximately 41,170 in 2004 to approximately 44,820 in 2014. These operators can expect about 405 openings due to growth and about 848 replacement openings for approximately 1,253 total annual openings.
- An increased demand for material moving equipment operators will stem from an expanding economy and increased spending on infrastructure. However, equipment improvements continue to raise worker productivity and moderate the demand for skilled operators.

- Above average employment growth is expected in construction companies, temporary help organizations, and equipment leasing companies. However, fewer operators will be needed in the manufacturing industry.
- The construction and manufacturing industries are sensitive to changes in economic conditions. Therefore, the number of job openings in these industries may fluctuate from year to year.

### Earnings

- In Pennsylvania, material moving equipment operator wages averaged \$28,300 to \$44,700 annually in 2005. Entry-level wages were between \$19,400 and \$32,800, while experienced operators earned anywhere from \$31,300 to \$50,600.
- The following table includes the average annual, entry level, and experienced level wages in 2005 for different material moving equipment operators in Pennsylvania.

Occupational Title	Average Annual Wage	Entry Level Wage	Experienced Level Wage
Conveyor Operators & Tenders	\$28,830	\$22,200	\$32,140
Crane & Tower Operators	\$36,600	\$26,590	\$41,610
Dredge Operators	\$29,360	\$25,480	\$31,310
Excavating & Loading Machine & Dragline Operators	\$30,370	\$20,590	\$35,250
Loading Machine Operators, Underground Mining	\$36,830	\$29,020	\$40,740
Hoist & Winch Operators	\$38,600	\$23,400	\$46,210
Industrial Truck & Tractor Operators	\$29,260	\$22,170	\$32,800
Gas Compressor & Gas Pumping Station Operators	\$44,660	\$32,780	\$50,600
Pump Operators	\$36,600	\$27,290	\$41,260
Wellhead Pumpers	\$29,750	\$24,980	\$32,130
Shuttle Car Operators	\$38,990	\$31,300	\$42,830

### Training, Other Qualifications and Advancement

Employers prefer to hire high school graduates for entry-level material moving equipment operator positions. Necessary skills are acquired through on-the-job training programs. These programs enable apprentices and trainees to operate light equipment under the guidance of an experienced worker. As experience is gained, these workers move on to heavier equipment, such as cranes.

Although most operators receive no formal training, there are some vocational schools that offer instruction in the operation of material moving equipment. Graduates of these programs may have an advantage when looking for an apprenticeship or trainee position. Before starting any formal training program, the reputation of the school should be checked amongst employers in the area.

Material moving equipment operators need a good sense of balance and eye-hand-foot coordination. They should also be able to accurately judge distance. Mechanical aptitude and prior training in mechanics may be helpful because workers may have to maintain their machines. Previous experience operating mobile equipment, such as in the Armed Forces, is also an asset.

### Related Occupations

Workers in other occupations with responsibilities and duties related to those of material moving equipment operators include railroad yard workers, construction equipment operators, farm equipment operators, truck drivers, and bus drivers.

### Sources of Additional Information

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Specialized Carriers and Rigging Association, 2750 Prosperity Ave., Suite 620, Fairfax, VA 22301-4312. Internet: <http://www.scranet.org>

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## Rail Transportation Occupations

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SOC CODES: 53-4011, 53-4012, 53-4013, 53-4021, 53-4031, 53-4041 and 53-4099

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### Significant Points

- Competition is expected to be keen for the limited number of job openings.
- A high-school diploma is required for entry-level positions.

### Nature of the Work

- Railroads deliver travelers and freight to destinations throughout the country. Likewise, subways and streetcars transport passengers within metropolitan areas.

*Locomotive engineers* operate diesel or electrically powered trains that carry cargo and passengers between stations. Assistant engineers help them monitor instruments and track signals.

*Railroad conductors* coordinate the activities of freight and passenger train crews. On freight trains, they review schedules and shipping records to obtain cargo information. Meanwhile, passenger train conductors are responsible for collecting tickets and fares.

*Yardmasters* are responsible for coordinating the activities of workers engaged in railroad traffic operations, such as the makeup, breakup, or switching of trains.

*Brake operators* do the physical work that is involved in adding and removing train cars at stations. In railroad yards, they are responsible for assembling and disassembling trains.

*Rail yard engineers, dinkey operators, and hostlers* drive engines within railroad yards, industrial plants, mines, quarries, or construction projects.

*Subway operators* control passenger trains that run on rail-guided tracks. Trains may run in underground tunnels, on the surface, or elevated above streets.

*Streetcar operators* drive electric-powered streetcars or trolleys. Some tracks may be recessed in city streets or have grade crossings, so operators must observe traffic signals and cope with other traffic.

- In an effort to reduce costs and take advantage of new technologies, many railroads are phasing out assistant engineer and brake operator positions.

### Working Conditions

- Because trains operate 24-hours a day, rail transportation employees have irregular schedules. They often work nights, weekends, and holidays. Seniority usually dictates who receives the more desirable shifts.
- Freight train workers rarely have scheduled assignments. Instead, their names are placed on a waiting list for work. Jobs are handed out on short notice and usually at odd hours. Shifts are more regular and reliable for passenger train employees.
- Most freight and yard workers spend their time outdoors, through varying weather conditions. Climbing up and down off moving cars is strenuous and can be dangerous.
- The appearance, temperature, and accommodations of passenger trains are more comfortable than freight trains.

### Employment

- Rail transportation workers held 112,000 jobs in 2004 in the United States and approximately 4,330 jobs in Pennsylvania.
- Almost three-quarters worked for railroad companies. Others worked for state and local government agencies.

### Job Outlook

- Employment of rail transportation workers in Pennsylvania is expected to decrease from approximately 4,330 in 2004 to approximately 2,980 in 2014. About 113 annual openings will result from replacement needs. Although no net employment growth is expected statewide, growth openings may occur in some areas.
- Competition is expected to be keen for the limited number of job openings. Very few rail workers leave their jobs because of attractive pay, tenure, and job security.
- Businesses are expected to increase their use of railroads to transport goods. However, employment growth will be adversely affected by technological innovations, such as fuel-efficient trains and computerized yards.

### Earnings

- In Pennsylvania, rail transportation workers averaged \$45,000 to \$57,000 annually in 2005. Entry-level wages were between \$29,000 and \$39,000, while experienced rail transportation workers earned anywhere from \$50,000 to \$67,000.

- The following table includes the average annual, entry level, and experienced level wages in 2005 for different rail transportation occupations in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Locomotive Engineers	\$56,580	\$37,410	\$66,160
Locomotive Firers	N/A	N/A	N/A
Rail Yard Engineers, Dinkey Operators & Hostlers	\$46,600	\$38,330	\$50,730
Railroad Brake, Signal & Switch Operators	\$49,010	\$37,710	\$54,660
Railroad Conductors & Yardmasters	\$45,340	\$29,290	\$53,360
Subway & Streetcar Operators	\$48,170	\$42,300	\$51,110

- No Pennsylvania-specific information was available for locomotive firers. However, the national average annual wage for locomotive firers in 2005 was \$42,710.
- Many railroad workers are paid according to miles traveled or hours worked, whichever leads to higher earnings. Full-time employees have steadier work, increased overtime opportunities, and higher earnings than workers assigned to the waiting list.

### **Training, Other Qualifications and Advancement**

Most rail transportation workers begin as yard laborers and undergo further training to become locomotive engineers and conductors. When hiring for entry-level positions, employers prefer applicants who have a high school diploma or equivalent education. Hand-eye coordination, manual dexterity, and mechanical aptitude are essential. Good hearing, eyesight, and color vision are also very important. In addition, brake operators must have physical stamina. All aspiring rail transportation workers must pass a physical examination as well as drug and alcohol-screening tests.

Employers usually select experienced applicants, who are at least 21 years old, to fill open locomotive engineer positions. Federal regulations require that all new engineers complete a formal training program that includes classroom, simulator, and hands-on instruction. After completing the program, participants must pass the qualifying tests before they are allowed to work as locomotive engineers. Once employed, workers undergo periodic physical, drug, and alcohol testing to determine their fitness. To judge an engineer's overall conduct, unannounced safety and efficiency tests are also given. Workers who fail any of these tests may be disciplined, restricted to yard service, or discharged.

Conductor positions are often filled with experienced brake operators who have passed tests covering signals, timetables, and operating rules. Because conductors earn substantially higher wages, there is a great deal of competition for any open positions. However, the major factor in determining who gets promoted is seniority. Eventually, experienced conductors may advance to managerial or administrative positions.

For entry-level subway and streetcar operator positions, employers prefer to hire high school graduates who are in good health. Applicants should have good communication skills and be able to make quick, responsible decisions. Selected workers are placed into on-the job training programs that last up to six months. At the end of their training, new operators must pass a qualifying examination. Experienced subway and streetcar operators may advance to supervisory positions, such as station manager.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of railroad transportation workers include aircraft pilots, bus drivers, truck drivers, driver/sales workers, and water transportation workers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Association of American Railroads, 50 F St. NW, Washington, DC 20001-1564. Internet: <http://www.aar.org>
- Federal Railroad Administration, 1120 Vermont Ave. NW, Washington, DC 20590. Internet: <http://www.fra.dot.gov>
- American Public Transportation Association, 1666 K St. NW, Suite 1100, Washington, DC 20006. Internet: <http://www.apta.com>
- Brotherhood of Locomotive Engineers, Standard Building, 1370 Ontario Ave., Mezzanine, Cleveland, OH 44113. Internet: <http://www.ble.org>

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## Taxi Drivers & Chauffeurs

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SOC CODE: 53-3041

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### Significant Points

- Opportunities should be best for good drivers who are willing to work flexible schedules.
- A special license is required.
- About 1 in 5 were self-employed.

### Nature of the Work

- Taxi drivers and chauffeurs help passengers get to and from homes, businesses, and recreational pursuits. They often inspect their vehicles and perform routine maintenance.

***Taxi drivers***, or cab drivers, use taxicabs to transport customers to their destination. They determine the passenger's fare, based on the length of the trip and amount of time it took.

***Chauffeurs*** operate limousines, vans, and private cars to transport passengers to hotels, airports, bus terminals, train stations, businesses, and entertainment venues. Some provide full-time transportation for wealthy families and private companies.

- Passengers usually hail or "wave down" taxi drivers that are cruising the streets. In high-traffic areas, such as airports and hotels, customers may wait in taxi lines. Others pre-arrange pick-ups by calling the cab company.
- In order to use the most efficient routes, taxi drivers and chauffeurs should be familiar with streets in the area they serve. They should also know the locations of frequently requested destinations.

### Working Conditions

- Because taxi companies operate 24 hours a day, drivers must be on duty at all times. However, work schedules may fluctuate from day to day. Many taxi drivers work longer hours during holidays, weekends, and other special events. Independent drivers may set their own work schedules.
- Although driving for long periods of time can be tiring and uncomfortable, taxi drivers and chauffeurs must remain alert and take precautions to prevent accidents. They should be ready to load and unload heavy luggage or packages.
- Taxi drivers face an increased risk of being robbed since they work alone and often carry large amounts of cash.
- Appearance is very important. Taxicab companies often require their employees to wear clean, neat clothes. Chauffeurs are expected to wear more formal attire, such as a uniform or tuxedo.

### Employment

- Taxi drivers and chauffeurs held 188,300 jobs in 2004 in the United States and approximately 5,700 jobs in Pennsylvania.
- Twenty percent worked for taxi and limousine services. Another 19 percent were self-employed.
- The following table includes the industries that employed the most taxi drivers and chauffeurs in 2004 in Pennsylvania.

Industry	2004 Employment	Percent
Taxi & Limousine Services	1,130	19.9%
Self-Employed	1,070	18.8%
Employment Services	500	8.7%
School & Employee Bus Transportation	330	5.8%
Automotive Equipment Rental & Leasing	290	5.0%

### Job Outlook

- Employment of taxi drivers and chauffeurs in Pennsylvania is expected to grow from approximately 5,700 in 2004 to approximately 6,750 in 2014. Taxi drivers and chauffeurs can expect about 105 openings due to growth and about 52 replacement openings for approximately 157 total annual openings.



- Job openings should be plentiful for taxi drivers and chauffeurs. Prospects will be best for individuals who are willing to work a flexible schedule, especially those with a good driving record.
- Opportunities can fluctuate from season to season as well as from month to month. Extra drivers may be hired during peak travel times.

### **Earnings**

Average hourly earnings of taxi drivers and chauffeurs in Pennsylvania were \$9.15 in 2005. The entry-level rate for a taxi driver or chauffeur in 2005 was \$6.26 while an experienced driver made \$10.59.

### **Training, Other Qualifications and Advancement**

Local governments establish the licensing standards for taxi drivers and chauffeurs. Although minimum requirements can vary by municipality, most companies set even higher standards than those required by law. When filling entry-level positions, employers generally prefer to hire high school graduates. In addition, it is common for employers to review an applicants' medical, credit, criminal, and driving records.

Individuals who are interested in driving a limousine or taxicab must obtain a special license, commonly called a "hack" license. Local authorities require that all applicants pass a written examination or complete a formal training program. To qualify for the license, aspiring drivers should have a thorough knowledge of local geography, motor vehicle laws, safe driving practices, and taxicab regulations. In addition, they should display some aptitude for customer service.

Once licensed, employers may provide additional on-the-job training that teaches new drivers how to operate equipment and complete paperwork. They may be shown where popular sightseeing and entertainment places are located. To better serve the disabled community, taxicab and limousine drivers may be shown how to handle mechanical lifting devices.

Aspiring taxi drivers and chauffeurs must have good interpersonal skills. They should be patient, tolerant, and even-tempered. Because they work with little supervision, drivers must be responsible and self-motivated individuals. Many companies encourage their employees to develop a strong customer base to improve business.

Although experienced drivers have a better chance of obtaining their preferred routes or shifts, other opportunities for advancement are limited. Some are promoted to dispatcher or manager positions. Others start their own company. However, an additional permit is required in order for independent drivers to operate their vehicle as a company.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of taxi drivers and chauffeurs include ambulance drivers, bus drivers, personal attendants, truck drivers, and driver/sales workers.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- National Limousine Association, 49 S Maple Ave., Marlton, NJ 08053. Internet: <http://www.limo.org>
- Taxicab, Limousine, and Paratransit Association, 3849 Farragut Ave., Kensington, MD 20895. Internet: <http://www.tlpa.org>

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## Truck Drivers

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SOC CODES: 53-3031, 53-3032 and 53-3033

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### Significant Points

- Employment opportunities should be very good.
- Keen competition is expected for jobs with the most attractive earnings and working conditions.
- A commercial driver's license is required to operate most large trucks.

### Nature of the Work

- Truck drivers are responsible for picking-up and delivering a wide variety of merchandise. The length of their trips depends on the final destination of the goods.  
*Light or delivery services truck drivers* make daily trips to deliver shipments to nearby cities. After dropping off their initial delivery, drivers usually pick up another load and drive it back to their home base.  
*Heavy truck and tractor-trailer drivers* transport goods from city to city. Employers may choose to use two drivers for trips that last several days.  
*Driver/sales workers*, or route drivers, are usually employed by wholesale companies and deliver products to businesses and stores. They solicit new orders and respond to customer complaints.
- Before leaving their home base, truck drivers inspect their vehicles to make sure that everything is working properly and that necessary safety equipment is aboard.
- Federal regulations require periodic drug and alcohol testing for active truck drivers.

### Working Conditions

- All truck drivers must adhere to the Department of Transportation's rules and regulations regarding hours of service. Truck drivers may not work more than 60 hours in any seven-day period and they must rest eight hours for every 10 hours of driving.
- Because truck drivers are usually compensated for the number of miles or hours they drive, many work close to the maximum time permitted. They frequently travel at night, during holidays, and on weekends.
- Newer trucks are relatively comfortable to drive and have been re-designed to reduce stress and increase the efficiency of long-distance drivers. However, driving for many hours and unloading cargo can still be tiring.

### Employment

- Truck drivers held 3.2 million jobs in 2004 in the United States and approximately 147,800 jobs in Pennsylvania.
- Nearly one quarter of all truck drivers were employed with local and long-distance trucking firms. Other worked for wholesalers and retail establishments. About 6 percent were self-employed.
- Although truck drivers tend to cluster in a few industry groups, they are found in many different industries. The following table includes the industry groups that employed the most truck drivers in 2004 in Pennsylvania.

Industry Group	2004 Employment	Percent
Transportation & Warehousing	47,390	32.1%
Wholesale & Retail Trade	43,450	29.4%
Manufacturing	14,150	9.6%
Self-Employed	8,950	6.1%
Accommodation & Food Services	7,930	5.4%

### Job Outlook

- Employment of truck drivers in Pennsylvania is expected to grow from approximately 147,800 in 2004 to approximately 164,300 in 2014. Truck drivers can expect about 1,650 openings due to growth and about 2,035 replacement openings for approximately 3,685 total annual openings.
- Because the strength of the economy dictates how much freight is moved by truck, employment opportunities may vary from year to year.

- Opportunities should be very good for local and long-distance truck drivers. However, keen competition is expected for jobs with the most attractive earnings and working conditions.
- Many companies will shift sales, ordering, and customer service functions to a central office. As a result, route drivers will have fewer job prospects.

#### **Earnings**

- In Pennsylvania, truck drivers averaged \$12.00 to \$17.20 per hour in 2005. Entry-level rates were between \$6.20 and \$11.70 per hour, while experienced truck drivers earned anywhere from \$14.70 to \$19.90 per hour.
- The following table includes the average annual, entry level and experienced level wages for various truck drivers in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Driver/Sales Workers	\$12.01	\$6.20	\$14.91
Truck Drivers, Heavy & Tractor-Trailer	\$17.14	\$11.70	\$19.87
Truck Drivers, Light or Delivery Services	\$12.35	\$7.49	\$14.77

#### **Training, Other Qualifications and Advancement**

When hiring new truck drivers, employers look for high school graduates with strong customer service, communication, and organizational skills. Drivers should get along well with other people and have a neat appearance. Because they work with little supervision, truck drivers must be responsible and self-motivated individuals. Many trucking companies prefer to hire applicants who are at least 25 years old and have at least three years of previous driving experience.

Truck driver qualifications and standards are established by State and Federal regulations. All drivers engaged in long-distance trucking activities must be at least 21 years old, have a clean criminal record, and pass a biannual physical examination. Aspiring truck drivers must have good hearing, 20/40 corrected vision, and normal blood pressure. Those with color blindness, epilepsy, or diabetes controlled by insulin are not permitted to be interstate drivers. Drivers cannot be taking any controlled substances, unless prescribed by a licensed physician. Federal regulations also require employers to issue periodic tests for drug and alcohol use. Before they are allowed to operate any truck that is designed to carry at least 26,000 pounds, drivers must obtain a commercial driver's license (CDL). Truck drivers who transport hazardous materials also need a CDL. To obtain a CDL, applicants must pass a written test and demonstrate their ability to safely operate a large truck. Additional information about applying for a CDL is available through the Pennsylvania Department of Transportation.

Most employers provide some on-the-job training for new truck drivers. However, this training is very informal and may consist of only a few hours of instruction from an experienced driver. Formal courses, which are offered by vocational-technical schools, are the most desirable form of training. Before attending one of these formal programs, aspiring truck drivers should check with local trucking companies to make sure that the training provided by that school is acceptable. In addition, high school courses in driver-training and automotive mechanics can also be beneficial.

Although some truck drivers are promoted to manager positions, advancement opportunities are generally limited to obtaining preferred schedules and more profitable routes. Some local truck drivers transfer to long-distance truck driving. Others take positions as dispatchers or delivery schedulers. A few purchase their own trucks and become self-employed.

#### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of truck drivers include ambulance drivers, bus drivers, chauffeurs, and taxi drivers.

#### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- American Trucking Associations, 2200 Mill Rd., Alexandria, VA 22314. Internet: <http://www.truckline.com>
- Professional Truck Driver Institute, 2200 Mill Rd., Alexandria, VA 22314. <http://www.ptdi.org>

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## Water Transportation Occupations

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SOC CODES: 53-5011, 53-5021, 53-2022 and 53-5031

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### Significant Points

- Most jobs require a merchant mariner's document or license from the U.S. Coast Guard.
- Competition is expected to be keen, especially for the well-paying ocean vessel jobs.
- A great deal of time is spent away from home.

### Nature of the Work

- Water transportation workers operate, maintain, and repair waterborne craft to move passengers and large amounts of cargo.
  - Captains* are in overall command of the vessel and its crew. They insure that proper procedures are followed and that equipment is in good working order.
  - Deck officers*, also known as *mates*, supervise crewmembers who are engaged in the maintenance of the vessel. They stand watch and would assume command of the ship if the captain became incapacitated.
  - Marine or ship engineers* operate, maintain, and repair propulsion engines, boilers, generators, pumps, and other machinery.
  - Seamen*, also called *deckhands*, operate the vessel and its deck equipment. Other duties include standing watch, measuring water depth, and performing routine maintenance. Larger vessels usually have a head seaman, known as a *boatswain*.
  - Qualified members of the engine department* (QMED) and *marine oilers* work in the engine spaces below deck. They lubricate moving parts, read gauges, and record data.
  - Pilots* guide ships in and out of harbors, through straits, and on confined waterways where knowledge of local water conditions is very important. They may pilot several ships in a single day.
- The size and service of the ship determine how many crewmembers are needed for a particular voyage.

### Working Conditions

- Merchant mariners find employment through union hiring halls or shipping companies. They are usually hired for one or more voyages that last several months. However, they have no job security after the voyage is over.
- Once at sea, workers are on duty seven days a week. Their schedules include standing watch for four hours and at least eight hours off. Those employed on the Great Lakes generally do not work during the winter when the lakes are frozen. Others are employed year-round.
- Although they usually try to avoid severe storms, water transportation workers must work through all types of weather conditions.
- Newer vessels are air-conditioned, soundproofed, and equipped with comfortable living quarters. However, spaces are still confining and long periods of time are spent away from home.

### Employment

- Water transportation workers held 72,300 jobs in 2004 in the United States and approximately 1,180 jobs in Pennsylvania.
- Almost 80 percent worked for companies that provide water transportation services for passengers and freight. General freight trucking companies employed another 9 percent.

### Job Outlook

- Employment of water transportation workers in Pennsylvania is expected to decrease from 1,180 in 2004 to 990 in 2014. About 40 annual openings will result from replacement needs. Although no net employment growth is expected statewide, growth openings may occur in some areas.
- Competition is expected to be keen for all water transportation occupations.
- Crewmembers will need to learn new skills in order to handle newer ships, which are designed to operate safely using a smaller crew.

### Earnings

- In Pennsylvania, water transportation workers averaged \$12.20 to \$26.20 hourly in 2005. Entry-level rates for water transportation workers were between \$7.90 and \$18.30, while experienced workers earned anywhere from \$14.00 to \$30.20.

- The following table includes the average hourly, entry level, and experienced level wages in 2005 for different water transportation workers in Pennsylvania.

Occupational Title	Average Hourly Wage	Entry Level Wage	Experienced Level Wage
Sailors & Marine Oilers	\$12.23	\$8.56	\$14.06
Captains, Mates & Pilots of Water Vessels	\$26.18	\$18.29	\$30.13
Motorboat Operators	\$15.37	\$7.98	\$19.07
Ship Engineers	N/A	N/A	N/A

- No Pennsylvania-specific information was available for ship engineers. However, the national average hourly rate for ship engineers in 2005 was \$27.54.

### **Training, Other Qualifications and Advancement**

Entry-level training and educational requirements for water transportation occupations are established and regulated by the U.S. Coast Guard, an agency of the U.S. Department of Transportation. All officers and operators of watercraft must be licensed. Different licenses are issued depending on the position and type of craft.

Applicants for a deck or engineering officer's license must have graduated from the U.S. Merchant Marine Academy or another approved institution. They must also pass written, physical, and drug screening examinations before even being considered. Those without formal training may apply for this license if they have at least three years of appropriate sea experience. However, it is very difficult to pass the written examination without formal schooling or independent study. It can take up to eight years to accumulate enough appropriate experience since seamen only work about six months out of the year.

The U.S. Coast Guard also issues a merchant mariner's document, which is needed to obtain a job as an unlicensed seaman in the merchant marines. Although most ordinary seamen positions must be filled with U.S. citizens, a small percentage can be filled with aliens who are legally admitted into the country and holding a green card. With experience at sea, and perhaps union-sponsored training, ordinary seamen can be promoted to able seamen. In addition to passing the required written examination, a medical certificate attesting to vision, color perception, and general physical condition may be required for higher-level deckhand positions.

No special training or experience is needed to become a seaman or deckhand on vessels that operate in harbors, rivers or other waterways. Most employers provide a short introductory course for these newly hired workers. Other skills are gained through hands-on experience. After gaining sufficient experience and substantial knowledge, these workers are eligible to take the U.S. Coast Guard examination and become a captain, mate or pilot.

Training for harbor pilots usually takes the form of an extended apprenticeship with a towing company or pilot association. Applicants may be able seamen or licensed officers.

### **Related Occupations**

Workers in other occupations with responsibilities and duties related to those of water transportation workers include fishing vessel operators, fishers, and some branches of the armed forces.

### **Sources of Additional Information**

- Pennsylvania CareerLink. Internet: <http://www.pacareerlink.state.pa.us>
- Maritime Administration, U.S. Department of Transportation, 400 7th St. SW, Washington, DC 20590. Internet: <http://www.marad.dot.gov>
- Seafarers' International Union, 5201 Auth Way, Camp Springs, MD 20746. Internet: <http://www.seafarers.org>
- U.S. Coast Guard National Maritime Center, Licensing and Evaluation Branch, 4200 Wilson Blvd., Suite 630, Arlington, VA 22203. Internet: <http://www.uscg.mil/stcw>
- U.S. Merchant Marine Academy, 300 Steamboat Rd., Kings Point, NY 11024. Internet: <http://www.usmma.edu>